

# AUTOMOTIVE INDUSTRIES

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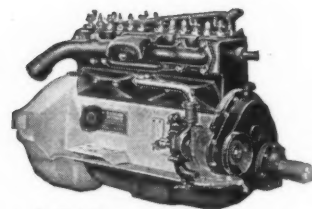
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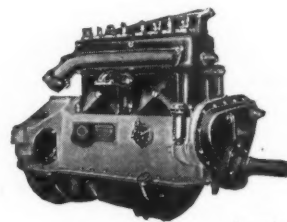
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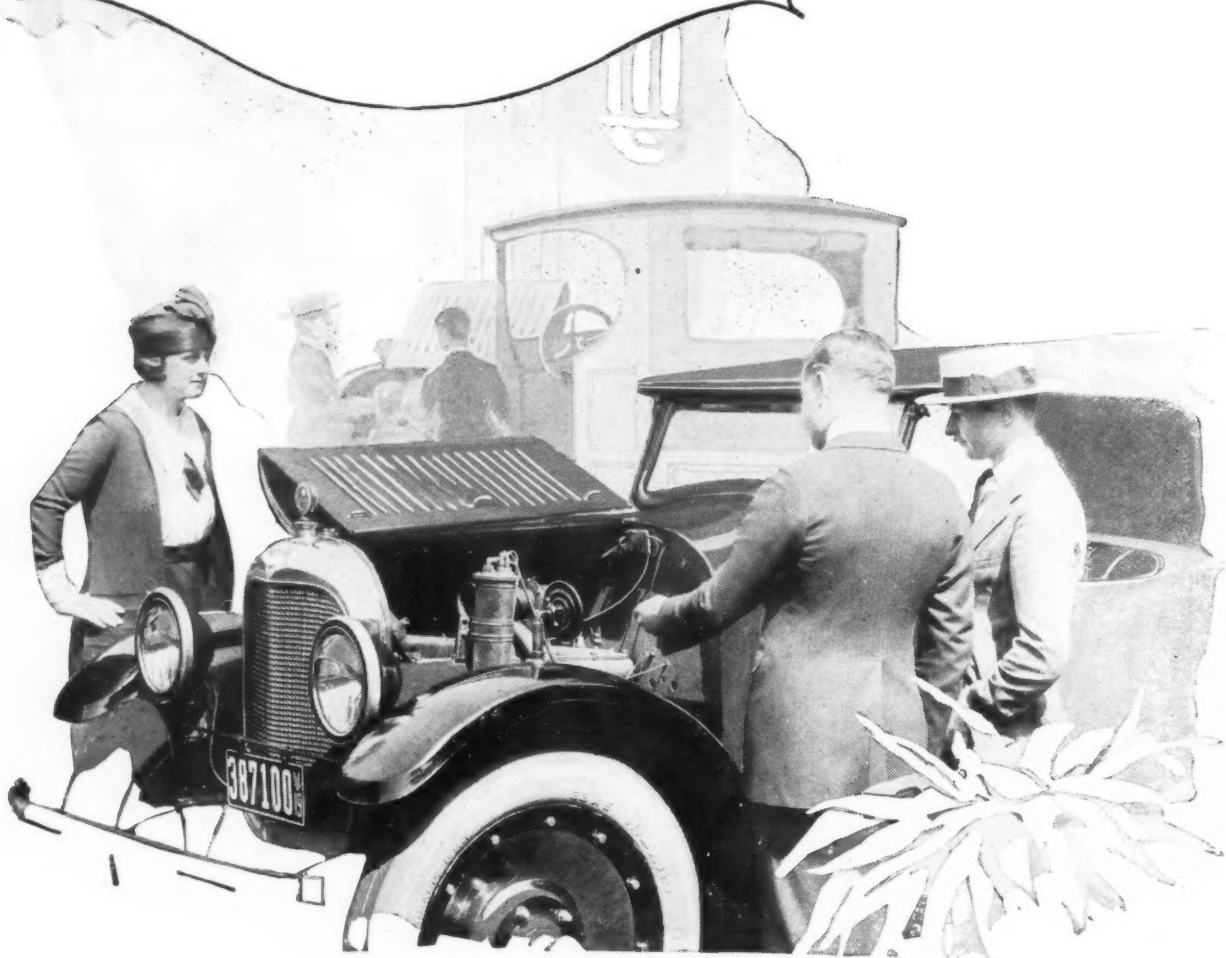
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# AUTOMOTIVE INDUSTRIES

## The AUTOMOBILE

VOL. XLI

NEW YORK—THURSDAY, AUGUST 21, 1919—CHICAGO

No. 8

## Three Air Service Bills Before Congress

Measure Introduced by Senator New Would Create an Aeronautics Department Under a Director, Congressman Curry Would Create Department Under a Director, While Third Is for the Air Service of Army—All Have Military Flavor

By Allen Sinsheimer

WASHINGTON, Aug. 19.

**W**ILL a co-ordinated air service, controlled by a single government agency, provide the greatest aeronautic development and insure the growth of the aircraft industry and continued air defense to the United States? If so, what limitations or breadth of authority should be imposed and how?

These questions, given a pronounced interest this week because of the recommendation by the American Aviation Mission for a National Air Service and a Secretary of Air, have also thrown the spot-light over the bills, now before Congress, on this subject. Three measures seriously affecting the Air Service have been introduced—one providing for a Department of Aeronautics and a Director, by Senator Harry S. New, another calling for a Department with a Secretary by Congressman Curry, and a third providing for a regular Army and a military Air Service by Secretary of War Newton D. Baker.

The bill introduced by Senator New would create a Department of Aeronautics, under a Director and Assistant Director, for the control of all aeronautics, including the military and naval and such other as the President may designate. It names a Director as the chief executive in place of a Secretary because,

according to the Senator, Congress has not the authority to impose a new member on the Presidential cabinet. If at any time the President would see fit to invite the Director to sit in the cabinet meetings he would then become a Secretary.

Postoffice air mail service would not necessarily be placed under the Director of Aeronautics, except in a more or less advisory capacity, unless the President so orders, as the bill, though placing "matters pertaining to the Postoffice" in charge of the Director, does not provide expressly, as with the Army and Navy, for the transfer of air mail equipment and personnel unless so ordered by the President.

All War and Navy aeronautics, including equipment, shops, personnel, moneys and buildings, would come under the new department. The Director would have full power to purchase buildings, equipment, and so forth, as he might desire for Army and Navy aviation.

Although the bill mentions that the Director would have charge of civil aeronautics also, the subject is mentioned briefly and without detail and the major effort of the measure is devoted to the transfer of the Army Air Service, the method of transferring rank, methods of promotions, number of officers, and



**SENATOR NEW'S**

Bill would promote officers according to length of service and has provisions whereby practically all lieutenants and captains would become majors within 12 years. This part of the bill reads:

That flying officers of the Air Forces, unless sooner promoted to fill existing vacancies, shall be eligible for promotion upon the following basis: After three years' service to be promoted to first lieutenant, after five years' service to be promoted to captain, after twelve years' service to be promoted to major, after twenty years' service to be promoted to lieutenant colonel, after thirty years' service to be promoted to colonel.

so forth. The bill would make length of service a more important factor for rank than ability, as it provides that Navy officers will take rank with Army officers according to length of service, and allows lieutenants and captains to be promoted to majors within 12 years.

This last provision provides for the personnel and designates that at the outset 70 per cent shall be lieutenants. As it makes no provisions other than this, it would be possible that at the end of the 12 years the Air Service might comprise an organization in which all of the lieutenants would have attained their majority and far outnumber the officers of lesser rank.

The New bill is perhaps too devoted to providing rank and promotions to Army officers and too little concerned with commercial aeronautics.

Similar criticism may be made about the Curry bill, which, regardless of Senator New's assertion as to the power of Congress to create a cabinet member, provides for a Department to be headed by a Secretary of Aeronautics. This bill calls for a Secretary and Assistant Secretary, and would place every phase of aeronautical activity under the new Department at once, including the Military, Naval, Postal and commercial aviation.

It would transfer to the new agency all equipment, personnel, buildings, and in addition an entire Army corps, including the Motor Transport Corps, Naval Flying Service, Aerial Mail Service, and so forth. It would give the Secretary the power to construct and operate factories for the manufacture of planes and engines, control of licenses to civil pilots, promulgation of laws, establishment of flying fields and furnishing of personnel to all government agencies requiring fliers or mechanics.

It would allow the Department to design planes and airships, maintain aeronautical schools and train and equip the air forces for the national defense.

Like the New bill, it devotes the major section of the provisions to the method of transferring Army officers, arranging for a Regular Air Force with a Legal Administrative Medical and Engineering Division, each of which would have its generals and less important officers and enlisted personnel, including

one major general, 10 brigadier generals, 98 colonels, 205 lieutenant colonels, 450 majors, 785 captains, and 2130 lieutenants, besides 2000 pilots, which would indicate that the Army would have a most important, perhaps a controlling, interest in the Department. The Air Force itself would comprise 50,000 enlisted men. A Reserve Air Force is provided for similar to the Regular organization.

Thus the Engineering Division, for example, which would comprise a general and 385 lesser rank officers, would have charge of aircraft factories, design, production, experimentation and manufacture and consequently would dominate this work and constantly permeate it with military rather than commercial development. Likewise the Legal, Administrative and Medical Divisions would be under the military men with similar results.

The bill sent to Congress by Secretary Baker provides for the creation of a Regular Army to have a regular military Air Service, consisting of one major general, one brigadier general and 1894 officers of lesser rank with 22,000 enlisted men. It has, however, made the Air Service a "detail organization" in place of a "regular corps," with the result that all officers for the Air Service will be men detailed by the President from the Infantry to the Air Service, where they would study aeronautics for four years, follow-

**CONGRESSMAN CURRY'S**

Bill would create an Engineering Division comprising military officers who would have charge of aircraft factories, design, production, experimentation and manufacture. This section of the bill reads:

One brigadier general, fourteen colonels, twenty lieutenant colonels, thirty-five majors, seventy captains, one hundred first lieutenants, one hundred and fifty second lieutenants, who will be commissioned in the Engineering Division of the Regular Air Force.

Another part of the bill reads:

The Engineering Division is charged, under the direction of the Secretary of Aeronautics, with the selection and determining of types and designs of all aircraft equipment and material, including ordnance and communicating equipment and material, and the repair and maintenance thereof; it shall operate and maintain such aircraft factories as may hereafter be authorized by law, and such repair and machine shops as may be authorized by the Secretary of Aeronautics; the production, experimentation and manufacture; the production, operation, and maintenance of aerial photographic apparatus; preparation of aerial photographic maps of the United States and its Territories and its possessions, and in field operations, of aerial maps of the theater of operations, and such other aeronautical engineering duties as may be assigned by the Secretary of Aeronautics.



ing which they would return for two years to the Infantry. This could easily destroy the initiative of the Air officers, as their promotion would depend on their two years of work in the Infantry, rather than on the four years in the Air Service. In addition, the Air Service is recognized by all nations to-day as being equally important with Infantry.

#### A Civilian View

That military domination of aeronautics would consequently result from the New or Curry bill is the opinion, therefore, of numerous officials, and those not in the military establishment object strenuously.

In a statement, Otto Praeger, Second Assistant Postmaster General, in charge of Air Mail Service, has pointed out the high efficiency attained by the post office service between Washington and New York, New York and Cleveland, and Cleveland and Chicago, whereby, for example, 13,000 letters are being carried from New York to Chicago in less than nine hours, advancing the mail to the Middle West 16 hours, this service continuing steadily regardless of weather conditions and operating at 93 per cent. More than 12,000,000 letters have been carried 272,628 miles by the Air Mail Service since its inauguration, said Praeger, and with the proper appropriations it will extend its scope so that mail can be carried from New York to San Francisco in 40 hours instead of 4 days.

The Air Mail Service, working hand in hand with the Navy Department, the Bureau of Standards and various Navy inventors, has contributed directly to the advancement of aviation in a measure that would not be possible, says Praeger, under a unified system wherein the military establishment would have complete control.

The Air Mail Service developed the compass now in general use, a significant departure from the earlier compass. The Service encouraged an inventor, who was unable to get assistance in the other departments, to develop a self-cleaning spark-plug which does not crack or fuse in the high-compression Liberty engine. It has worked out, in conjunction with the Bureau of Standards, a device to locate landing fields accurately by sound at times of utter invisibility, and the close co-operation between the Navy and the Air Mail Service resulted in the development of the radio direction-finder now used by the Navy.

Likewise, the gyroscopic turn-indicator, showing the pilot in fog or rain whether his plane is turning to the right or left from its course, was developed through the Air Mail.

"Yet," states Praeger, "in the face of all the forward steps taken and the unparalleled flying record of the Post Office Department, Congress is being asked to take from this Department the operations of the Air Mail on the

#### OTTO PRAEGER,

Second Assistant Postmaster General, says:

"Their proposed unified Air Service is a military service pure and simple, operated by generals, colonels, majors, captains, lieutenants and enlisted forces. They are not satisfied with letting the military develop and perfect military aviation, which in itself is a man's size job, but they want to fasten military control on the operations of the commercial aviation of the Post Office Department."

#### SECRETARY BAKER'S

Bill providing for the regular army would make the Air Service a detailed organization, taking its officers from the Infantry, Cavalry, Engineers or Artillery, as the provision for Appointment of Officers makes no mention of the Air Service. The section of the bill reads:

Sec. 31. APPOINTMENT OF OFFICERS—Hereafter all appointments of officers in grades below that of brigadier general shall be by commission in the Infantry, Cavalry, Field Artillery, Coast Artillery Corps, Corps of Engineers, or one of the corps of the Medical Department, or as chaplain, band leader, or professor at the United States Military Academy. Those now commissioned in said branches will continue under existing commissions; all now otherwise commissioned will be recommissioned with their present grades and dates of rank in the Infantry, Cavalry, Field Artillery, Coast Artillery Corps, Corps of Engineers, as may, in each case, be directed by the President.

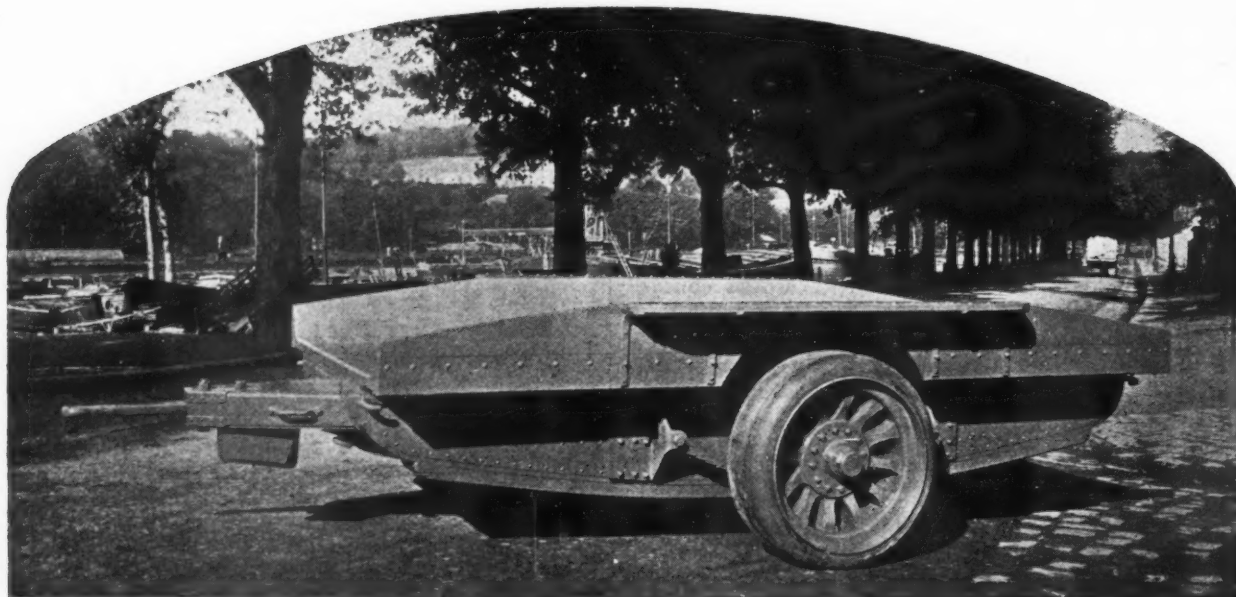
ridiculous theory that a civilian organization can not know anything about flying and—just think of this!—on the assumption that the Post Office Department can not operate a separate Air Mail Service as economically as it might be operated by a military organization. An investigation of the cost of military flying as compared with the cost of the air mail operations will settle that contention.

"You have heard something about an Air Ministry or a unified Air Service. The question whether military aviation activities should be under one control by combining the Army and Navy Air Services is a question that should be determined by the best military judgment, but the advocates of a unified Air Service go much further than proposing merely to unify military aviation. They want to militarize all other aviation, including the Air Mail of the Post Office Department.

"There is as much sense in a military air service operating the commercial air mail of the Post Office Department as there is in the Motor Transport Corps of the Army operating the Post Office Department's motor truck service in your cities and on your star and rural routes.

"I am well aware that there is on foot a strong propaganda in favor of a unified Air Service, which is to conduct the non-military as well as the military aviation of the Government. This campaign is being engineered by persons who imagine that the airplane industry of the country can not exist unless kept up by military contracts.

"No one knows better than the aircraft builders that in the long years of peace ahead of us commercial aviation will far outstrip military aviation, and that no greater obstacle can be thrown in the way of commercial aviation than to subordinate it to military control. They are shrewd business men, and, whatever may be their views on the subject of unifying all purely military aviation, I do not believe that, on due reflection, they will desire to see the obstacle of military control laid in the way of commercial aviation for the sake of a temporary flow of big military orders from a well financed United Air Service."



*This is a special type heavy low center of gravity trailer, used for hauling guns behind four wheel drive tractors. This is practically an all-metal construction*

## Trailer Lessons from the Allied Army Service

The most extensive use of trailers was that in France, toward the end of the fighting. At that period the Air Service was making extensive use of trailers and some use of them was made by other branches. Mr. Bradley was a student of the situation and his conclusions form the first unprejudiced statement. He makes his major premise on the human element—the antipathy of the truck driver to be handicapped with a trailer.

By W. F. Bradley

PARIS, Aug. 1.  
**A**UTOMOBILE trailers in use with ordinary trucks having a normal carrying capacity of  $1\frac{1}{2}$  to 5 tons proved their value during the war as a means of economizing the cost of road transportation. In consequence of the experience gained in this direction, the commercial use of trailers in civilian haulage is now undergoing considerable development in France for all kinds of trucks, and also, in a more limited measure, for touring cars.

The adoption of trailers in the automobile services of the various armies in France was not without difficulties. These were due, in practically every case, to defects in design and construction, or to inexperience in the use of trailers. As the result of their service in France, hundreds of officers can be found willing to swear that trailers are useless and impracticable.

In the American army numbers of convoy officers refused to use trailers; or if trailers were allotted to their organizations they employed them as storehouses or sleeping quarters and only used them as rolling stock when it was absolutely necessary for the organization to change its location. This does not by any means prove that the

trailer is an unsatisfactory type of vehicle. Closely inquired into, it was found that all these cases of dissatisfaction could be classed under one of the two headings already mentioned, namely, defects in design or construction, or ignorance in the use of trailers.

In both the French and the American armies in France, it was constantly discovered that convoy officers who conscientiously paid attention to the mechanical condition of their trucks were most neglectful of their trailers. It was rare for any one man to be assigned to duty in charge of a trailer. The truck driver generally took the trailer given to him, and having no responsibility for its maintenance, did not give any attention to its condition. A truck with a trailer is a little harder to drive than one without that attachment; thus it is not to be wondered at if the men who were called upon to pick up a strange trailer were rather glad than otherwise if it broke down and had to be abandoned by the roadside.

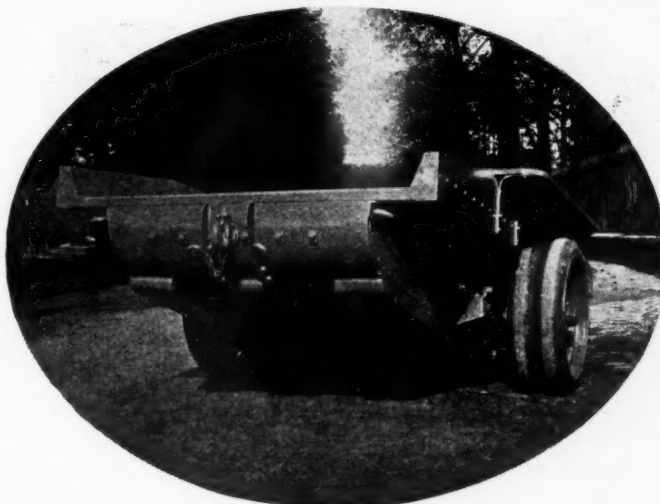
Practically all the French-built trailers in service with the American Army in France had plain bearings in the road wheels. Satisfactory service could only be obtained from these on condition that the hub caps were kept filled with grease and turned up every day, or after 60 miles



running. This is particularly important when the bearings are new. Notwithstanding the fact that this was impressed on officers and men, there were numerous cases of seized bearings owing to lack of attention to lubrication.

When running light a trailer is subject to more shaking and vibration than a truck. Thus spring clips should be kept tight and should be examined at very frequent intervals, and the various assembly bolts of the body should be given close attention. In the army this was rarely done, with the consequence that there were delays on the road owing to the looseness of bolts and subsequent breakage of parts. Spring shackle bolts rarely were greased. This was not always the fault of the driver, for numbers of trailers were turned out lacking all provision for lubrication. But even when these were present they were more often neglected than attended to. Drivers who were very careful about the condition and inflation of the tires of their trucks paid no attention to the inflation of their trailer tires. In the Air Service in particular, many pneumatic tired trailers were only called upon for occasional service, and generally on these occasions it was discovered that the tires were flat or unfit to go out. The consequence was, in some cases, that two trucks would be sent out where the work could have been done equally well by a single truck with trailer. The lesson in this is that the driver has to be educated to the use of a trailer. The idea must not be allowed to exist that because the mechanism of a trailer is simple it therefore requires no attention. Few army drivers in France had had previous experience with trailers, and the defects which developed were due in many cases to ignorance.

Before giving examples of specific cases of defects in design and construction, it is advisable to present an outline of the types of trailers in use and the work they had to perform. The Air Services of all the armies were the biggest users of trailers. As the Air Service of the American Army could not get delivery of rolling stock from home in time to meet its flying program, orders were placed in France for large numbers of trailers. It may be estimated that 95 per cent of the trailer work of the Air Service in France was done with French built trailers, the American trailers coming into France only a short time before the armistice. The French types were adopted

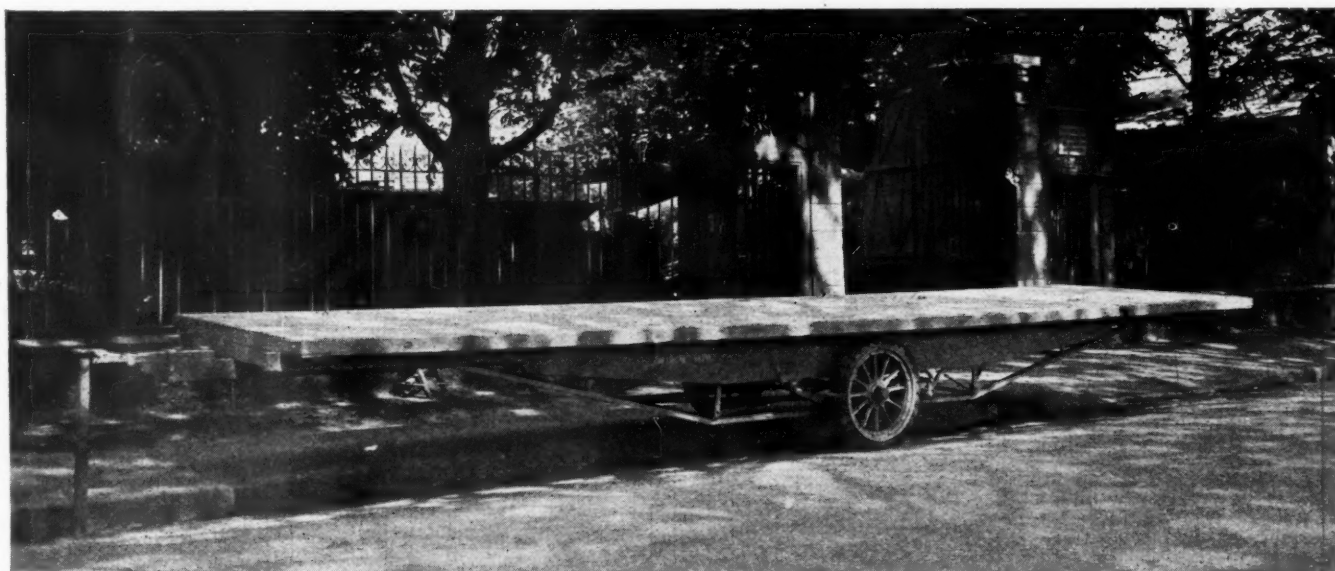


*Special low trailer for hauling guns. The gun remained on its carriage and was run direct onto the trailer. A very low center of gravity is necessary, also quick loading and unloading facilities*

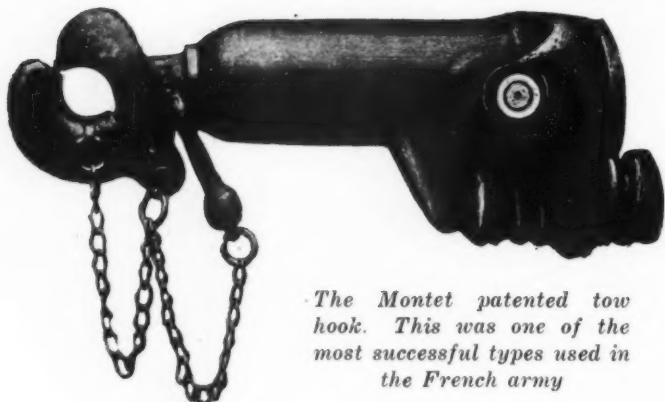
somewhat blindly, with the result that the French mistakes were perpetuated in the vehicles delivered to the American Army. These mistakes were discovered after the vehicles had gone into service and had to be remedied as work went on.

Attempts have been made to raise argument as to the merits and demerits of the two and four-wheel trailers. Some manufacturers of four-wheel types have taken much trouble to prove that the two-wheeler is wrong in principle. This is a false position to adopt. The two-wheeler and the four-wheeler each has its field of usefulness, and it is a mistake to endeavor to prove that either one or the other is unsuitable. Most of the objection coming from America has been against the two-wheeler. The result was that at the outset of the campaign in France there was an attitude of suspicion in the American Army against the two-wheel trailer.

Active service experience proved that this suspicion was altogether ill-founded. The two-wheeler gave such a good account of itself on French roads and for the class of work



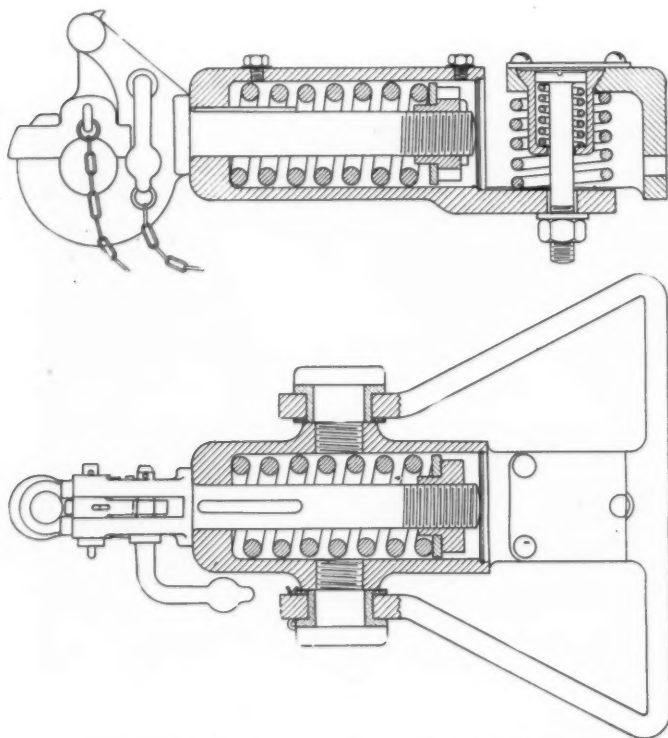
*The 26-ft. platform trailer of the air service. This type of trailer gave trouble owing to sagging of platform. It will be noticed that it is heavily braced, but there was a tendency for this bracing to work loose. Note also that the eye is attached to leaf springs to give a certain amount of flexibility in the attachment*



*The Montet patented tow hook. This was one of the most successful types used in the French army*

for which it was designed that towards the end of the war the majority of convoy officers were in favor of it in preference to the four-wheeler.

The two-wheeler truck is better than the four-wheeler; it is cheaper to construct; it is lighter; and its frictional resistance is less. Up to and including a useful load of 2 tons the two-wheel trailer is always equal to and often better than the four-wheel type. When the useful load is more than 2 tons the four-wheel type should be adopted, unless there is some special reason to the contrary. When the platform length of the trailer exceeds 20 feet, it is advantageous to make use of two axles. In the Air Services of the various Allied Armies in France two-wheel trailers were employed with a platform length of 22, 26 and 29 feet. They were made use of for carrying wings and fuselages, these being very light but bulky loads which could be put on or taken off a two-wheeler much more readily than on a four-wheel trailer. Although used for this light work, all these long trailers gave trouble after a certain length of time by reason of the ends of the platform sagging. If the main frame members were made sufficiently heavy to prevent any sag, or if they were heavily trussed, the two-wheeler lost its main advantage by becoming as heavy as the four-wheeler. In all these cases



*Potron tow hook. This was one of the best of those used by the French and American air services*

wood construction was adopted, owing to the difficulty of getting metal for this class of work. There is no doubt, however, that some of these difficulties could be overcome by means of a light all-metal construction.

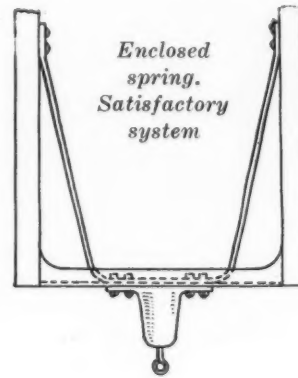
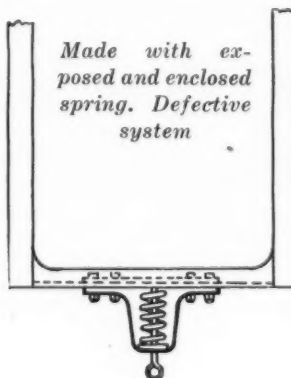
In the Air Service of the French Army 14 types of two-wheel trailers were employed, compared with three types of four wheels. The tendency was towards an increase in the types of bodies, but at the same time an effort was being made to diminish the number of sizes of platforms, wheels, axles, springs and tow hooks. The smallest two-wheel trailer carried a useful load of 1000 pounds. The type of two-wheeler in most common use was one with a capacity of 2500 pounds. The only 3-ton two-wheel trailers used by the French Air Service were attached to machine shop trucks and were a successful type. Three-ton two-wheel trailers were used by the American army for general haulage, but did not give great satisfaction. In the French Air Service the four-wheel trailers did not exceed a load capacity of 3 tons.

It would be a mistake to copy regular army types of trailers and endeavor to apply them to civilian service. Trailers were essential to the Air Service, for instance, owing first to the fact that many of the loads were too light and too bulky to be carried on a truck, and secondly, because much of the material required by a squadron only had to be used at infrequent intervals and could best be handled by trailers which were used both as storehouses and for transportation.

#### Pneumatic Tires Needed

An airplane can always be handled more economically on a trailer than on a truck. Large quantities of supplies must be kept in readiness for use with squadrons and must be ready for removal immediately a unit changes its location. It is better to have these stores on a trailer, which can be hitched up behind a truck at a moment's notice, than to have them in boxes which must be loaded when an order to move is received. In the Air Service 40 per cent of the work was trailer-haulage and 60 per cent trailer-storage.

All the Air Service work was of a comparatively fast nature. Most of the work was done by fast pneumatic tired trucks of 1½ tons capacity, these hauling trailers having a load capacity up to 2500 pounds. When the truck had pneumatic tires, the trailer also was equipped in the same way. The most generally employed type of trailer in the French and American Air Services was a two-wheeler of 17 feet platform length, platform width of 38 inches, high wood sides and canvas top. This was made use of for general aviation stores and was usually hauled by the 1½ ton light aviation trucks. Although the high wood sides added to the weight of the vehicle, it was found necessary to adopt these in place of bows and canvas, owing to the tendency of the canvas to burst if the load went adrift. This applies also to many of the trucks, the bodies





of which had to be made considerably higher than originally provided for.

There was an infinite variety of trailers in use by the Air Service doing work which could not adequately be performed by trucks, or at any rate only performed by them at tremendous cost. For instance, all the aerial photography developing and printing was done on special trailer laboratories. Gasoline was brought up on two-wheel tank trailers. Hangars, wings, wheels, landing gears, boxed aviation engines were always carried on trailers, some of these being special vehicles which as frequently acted as storehouses as trailers, and others being general types always in use as trailers.

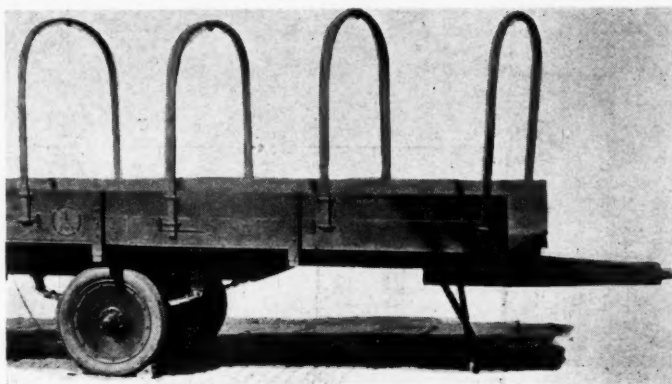
The European practice is to put the hook on the trucks and the eye on the trailer. Some important makers bolted the tow hook direct to the center of the rear transverse frame member. According to their own calculations, and the tests they made on ordinary roads, this was satisfactory. On active service, however, this always gave trouble, and in not a few cases the cross member was pulled away from the side frame members. When heavy gusset plates were fitted, the hooks were torn out of the cross member.

The only satisfactory mounting was by the use of a triangular construction from the side frame members to the rear frame member, the bolts holding the hook in position going through both the cross frame member and the stay, as shown on page 356. In no case did this structure fail. Nearly all the other types gave trouble.

#### Spring Trailer Hooks

All the European armies employed the spring in the trailer hook, and consequently on the truck. Various types were used, but the best had the spring enclosed. It was found very advantageous, particularly when the two-wheel trailers were employed, to have a spring not only in a horizontal plane, but also in a vertical plane. A cushioning effect when taking up the load is absolutely essential, and no trailer ever was used without a spring hook. With a two-wheel trailer, however, there is a considerable vertical movement, and on rough roads very violent shocks in a vertical direction are transmitted to the trailer hook. In order to eliminate these shocks, some of the trailers were fitted with leaf springs at the end of the drawbar, the trailer eye being bolted to the main leaf of the spring.

A considerably better arrangement was that of the

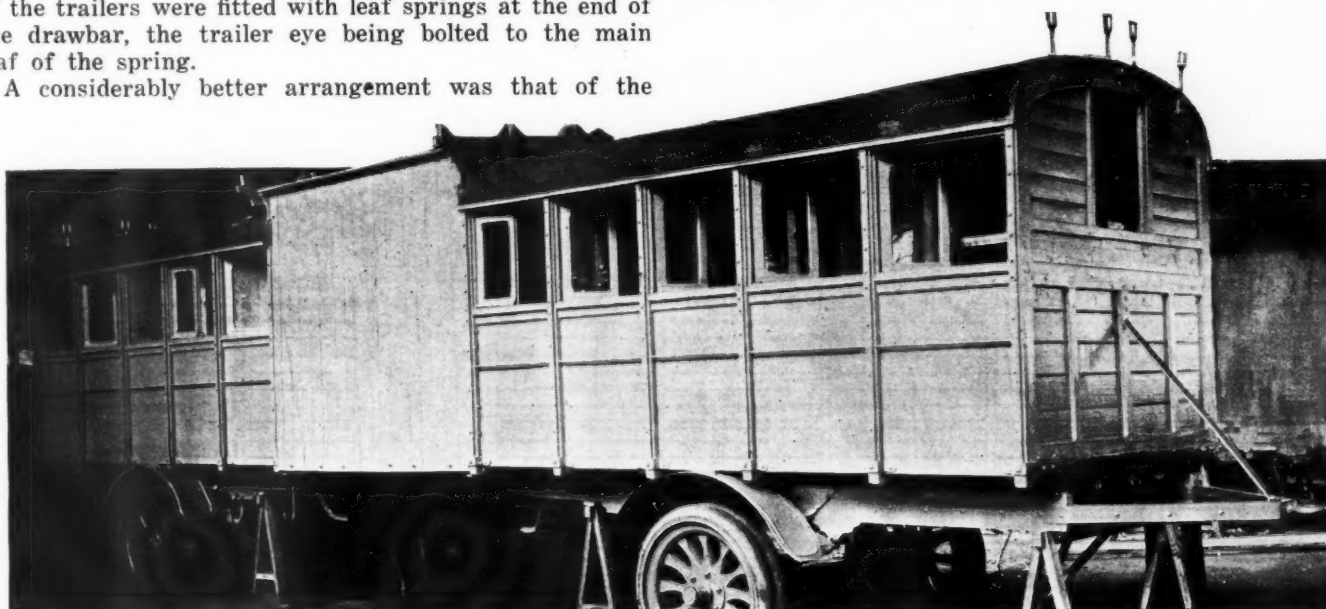


*Two-wheel light aviation trailer built by the Ohio Trailer Company and used overseas. This was a well constructed job, but its dimensions were wrong. With a platform length of 20 ft. it was too short for carrying airplanes, and was too long for general haulage*

Potron tow hook. As will be seen from the drawings, there is a main horizontal spring and also a vertical coil spring. With this device 26-foot trailers could be handled at speed over rough roads with practically no whip. Another very good type of hook employed by the French and the American forces was the Montet. As will be seen from the illustration, the same effect is obtained by pivoting the main horizontal shaft of the hook, the pivoted surfaces having bronze bushes, and by fitting a double coil spring to take care of the oscillations, in a vertical plane, or the hook.

Another feature of the Montet is that the hook has a bushed face. It being impossible to lubricate the hook and the eye, wear was rapid, particularly on fast two-wheel trailers. This bushing could be renewed easily and cheaply, and constituted a valuable improvement. It will be noticed that in both the Potron and the Montet hooks the main spring is enclosed and has adequate means of lubrication.

There were two main methods of attaching the trailer eye. In one construction a heavy central wood shaft was



*An example of two ordinary 3-ton two-wheel trailers, fitted with a special body for telegraphists, the two being connected together by a demountable covered passageway. This is an example of defective construction in the towing mechanism. Despite the bracing from the eye to the front panel, this would be certain to buckle if carrying a full load over rough roads*



*This is a very good type of tank trailer built for the French Air Service. It is fitted with filling and scavenging pumps, filter and measuring apparatus. The front box is for oil. Note that the main shaft is armor plated and is fitted with tie members; these were essential*

employed, and the forged trailer eye bolted to this. In the second class the pull was taken from the main side frame members to which were bolted a triangular angle iron construction with the hook at its forward end. An example of the latter is to be found in the Ohio trailer, of one ton capacity, built for the American Air Service, and used overseas, also in the telegraph trailer built by the Perney Company, in France, shown at the bottom of page 357. An example of the second class is the French aviation general purpose trailer shown below. This was also used to a very considerable extent by the American Air Service. Designed to carry a maximum load of 2600 pounds, but rarely loaded beyond 2000 pounds, the main central shaft of this trailer had a depth of 5.1 inches and a face width of 2.9 inches. The forged eye, 2.9 by 0.8 inch, was bolted on the top of this.

Although the quality of the wood appeared to be all that could be desired, there were many cases of these shafts fracturing in a vertical plane. This trouble was overcome by armoring the shaft with a steel plate on each of its lateral faces. When the pull was taken from the main frame members, very many cases arose of buckling up of the steel towing attachment. On the telegraph trailer, at the bottom of page 357, it will be seen that this has been trussed by means of a stay placed just behind the eye and bolted to the front panel of the body. There is a somewhat similar construction in the tank trailer built by the Perney Company, illustrated above.

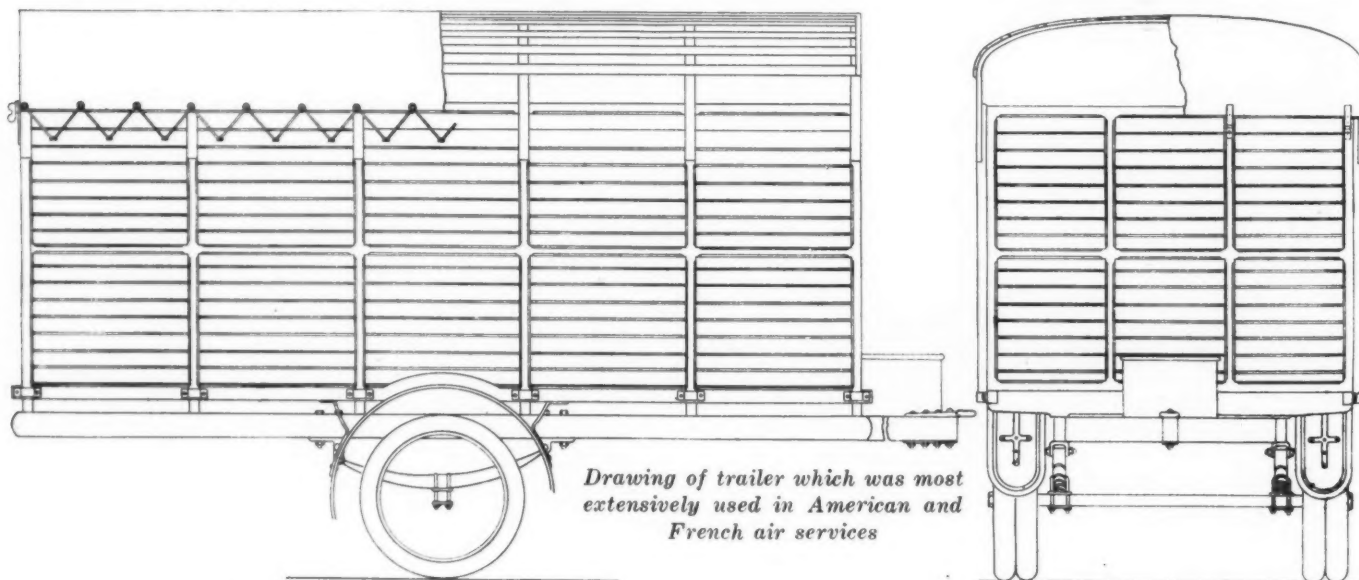
In the American and the French services there were more two-wheel trailers equipped with pneumatic than with solid rubber tires. Except in a few very exceptional cases four-wheel trailers were not fitted with pneumatic tires. Among these exceptions were photographic laboratory trailers and big platform trailers for carrying hydroplane hulls. No trailers were employed without rubber tires. Pneumatic tired trailers should have the same size wheels and tires as the truck used for hauling them. This was completely approved, though not thoroughly adopted by any service. The American Air Service, which could have done this without any difficulty, displayed such a lack of continued directive policy that not only different sizes but different types of wheels and tires were used on trucks and trailers. For the light aviation truck the best plan would have been detachable steel wheels all round, the tires and wheels being interchangeable on truck and trailer.

Considerable experience was obtained with solid rubber and pneumatic tire trailers for various kinds of haulage. The light aviation trucks had a road speed of 25 miles an hour, and although this speed was rarely attained with a trailer behind, it was not uncommon to run at 20 miles an hour. One common defect was the breakage of stub axles when solid tired trailers were run at speed over hard French macadamized and granite paved roads. With the use of pneumatic tires these breakages were enormously reduced, but, of course, the cost of operation increased.

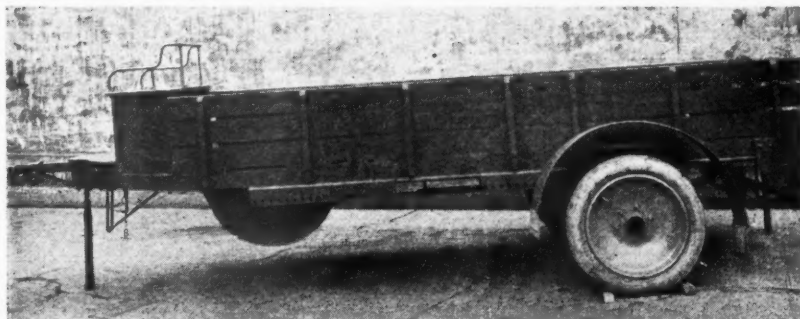
#### Elastic Hub Type Wheel

Because of the high cost of operating with pneumatics and on account of the delay and annoyance of axle breakage when running with solids, the French technical section experimented with an elastic hub type of wheel fitted with solid tires. This hub, which is shown on page 359, was applied to a small number of two-wheel 28-foot overall platform trailers, which were the most difficult type to operate. The results were very satisfactory. The flexibility was equal to pneumatics, and although the trailers were constantly in service both at the rear and with the French and American squadrons at the front, no axle breakage was reported.

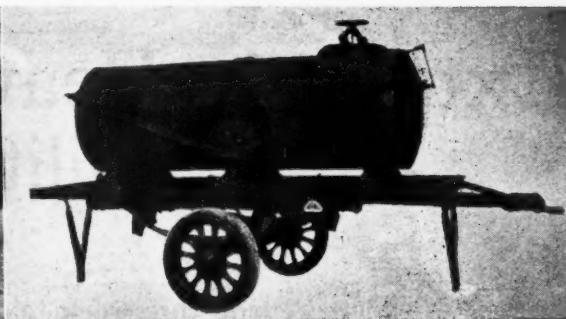
As will be seen from the drawing, this device consists of blocks of rubber interposed between an inner and an outer hub. The rubber blocks are completely protected, they are readily changed, they provide the necessary amount of elasticity to absorb road shocks, and they also







*On two-wheel trailers the axle was usually placed amidships. On this type the axle is movable. Few of these were used in France and there is no definite report on them*



*This is an example of how not to build a trailer. Owing to high center of gravity, these could not be towed. They were used as store tanks*

take up lateral shocks which may come from striking the pavement. Similar devices have been proposed for trucks and cars, and have met with mediocre success. For trailer work, however, a wheel of this type is undoubtedly valuable.

The American army aviation trucks built in France were equipped with plain bearings. The only trouble experienced with these was due to inattention to lubrication. Truck drivers have been trained to give attention to road wheel bearings at very infrequent intervals, with the result that they took out new plain wheel bearing trailers, neglected to lubricate them, and suffered seizure. When properly lubricated, these bearings were satisfactory. The French Air Service always used ball bearings, and avoided all lubrication troubles.

#### Standardized Axles and Wheel Bearings

By the beginning of 1918 the French Air Service had standardized on three types of axles and six types of road wheel bearings.

The axles had a diameter of 50, 55 and 60 mm. (1.9, 2.16 and 2.36 inches) and were employed for both two and four wheelers, the axle loads varying from 2400 to 3700 pounds.

The pneumatic tire size most commonly employed was 820 x 120, but it was recognized that it would have been preferable to use 880 by 120 (35 by 5 inches), so as to interchange with the tires used on the light aviation trucks. An effort was being made to do this, and to employ detachable steel wheels, but a false start having been made it was difficult to change over during the war. Practically the only size of solid tire used was 850 by 120 single (34 by 5 inches).

Many of the trailers sold to the army were built on wagon maker rather than on automobile standards. Thus some spring shackle bolts were not machined and were unprovided with lubricators. Spring clips were of poor quality and were not fitted with lock nuts or cotter pins.

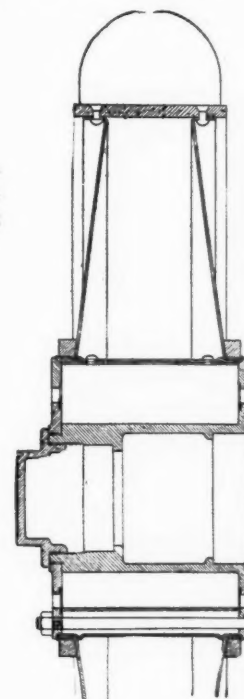
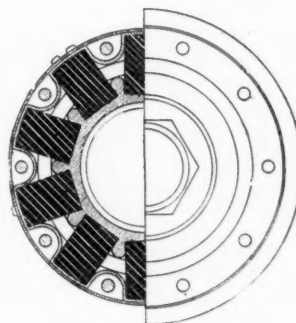
All trailers used in the army air services ran without brakes and without an attendant. The work was done behind ordinary trucks of 1½, 3 and 3½ ton capacity, the trucks in no case having been specially designed for trailer work. Army drivers were always difficult to curb, and sometimes they caused accidents by reason of their high speed and carelessness, which would not be likely to happen to a civilian driver. If a truck hauling a two-wheel trailer were braked sharply, there would be a tendency for the trailer to swing right across the road. This was overcome by fitting brakes to the wheels and connecting the brake control rods up to the towing eye, so that as soon as the trailer began to overrun the truck the brakes were automatically applied. The mechanism was simple and the result entirely satisfactory.

In the air service, and in the general automobile service of the armies, no defects developed in trucks as the result of the use of trailers. It was conclusively proved that any ordinary truck could be used with a trailer with a 60 per cent economy in the cost of operation. Trucks with bevel, chain, worm and internal gear drive were all made use of by the French for hauling trailers, but it was not found that there was any injury to the mechanism or any abnormal inefficiency with any one of these types of drive.

The conclusion is that whatever the type of truck, a trailer can be used in conjunction with it without any inconvenience and with considerable economy. In giving the above experience ordinary trucks not designed primarily for trailer work have been in mind.

The trailers were not always of the best, and as has been shown embodied many defects for which inexperience and war conditions were responsible. The experience in France has shown the necessity for standardization of wheels, tires, bearings, axles and springs. For what may be termed the chassis, metal should be used more extensively, to the exclusion of wood. Wagon builders' standards will not suffice; the automobile standard of construction must be adopted. There are perfect tow hooks and eyes on the market, but a number of very imperfect ones are still in construction. Elastic hub wheels are worth developing for trailers, but not for trucks.

*Elastic hub wheel for trailers. This was an experiment with very good results, but was not put into production*



# Extremely Heavy Frames for German Military Trucks

## PART III

Colonel Slade this week takes up the frame structure of the German military trucks which he catalogued at Coblenz after they had been turned over to the A. E. F. He presents sketches of the most notable of the frames and remarks that there was little effort at standardization and that some unimportant features required special dies.

By Lieut.-Col. Arthur J. Slade

**I**N examining the designs of the German military trucks in greater detail than has been done in the preceding articles, consideration will first be given to frames. Much variation is found in the degree of flexibility provided, as well as in other features.

**Dixi**—The frame of the Dixi 3½-ton is of pressed steel channel section 6 in. deep in the center, tapering at each end, and the side rails 35 in. apart at rear and drawn in at the forward end. Three pressed steel cross members are provided. The sketch shows the general arrangement of this frame, which is quite flexible.

It is interesting to note that the engine and transmission are both mounted by four-point suspension from the side rails of this flexible frame.

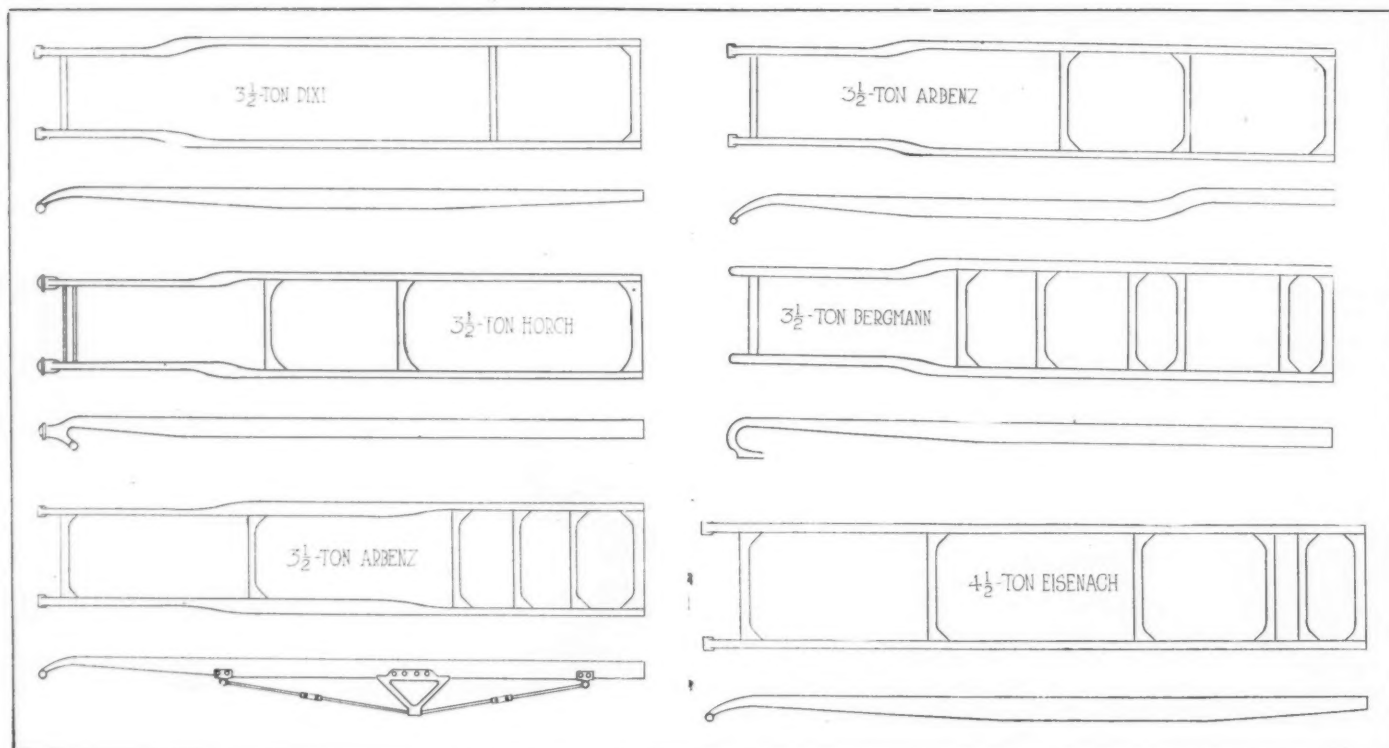
**Horch**—The Horch 3½-ton shaft-drive is of pressed steel, 33½ in. in width at rear and narrowed at front end, with four cross members, the intermediate members being at rear of motor and at forward end of propeller shaft tube

supporting the latter. This frame also has considerable flexibility.

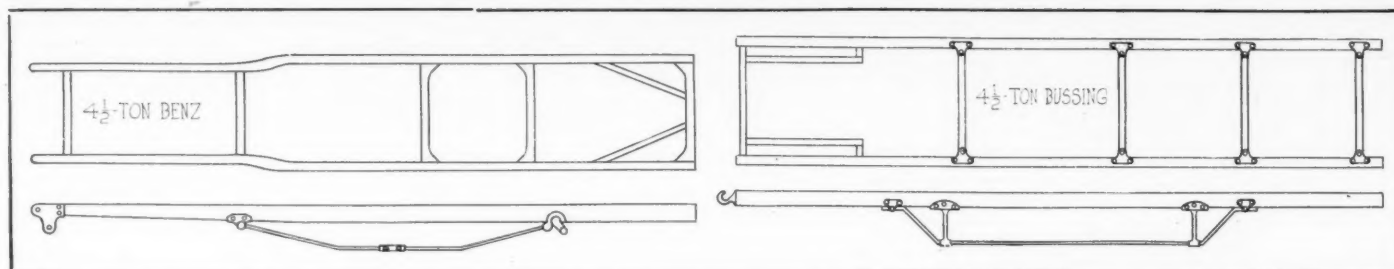
**Arbenz**—The frame of the Arbenz 3½-ton chain drive truck, as will be seen from the sketch, is heavily braced and also trussed. It is of pressed steel.

The width at rear is 34 in. and is narrowed at front. The cross members are placed at front and rear of motor, front and rear of transmission, and two at rear of frame where towing connection is supported. These cross members with integral gussets and liberal contact surfaces, in connection with the shape of the side rails, contribute to a very rigid frame construction. The motor is four-point suspended, as is also the transmission.

The frame of the 3½-ton shaft-drive Arbenz lacks the rigidity of the chain-drive model, having only four cross members and lacking the truss. It is raised over the axle, tapered in section and narrowed at front as indicated in sketch.







The engine and transmission are both four-point suspended.

**Bergmann**—Another rigidly braced frame is found on the Bergmann 3½-ton chain drive. This frame is constructed from 7-in. pressed steel channel section, 37 in. in width at rear and narrowed at front. Seven cross members are employed. The sketch shows the general arrangement. The engine and transmission are both suspended at four points.

**Eisenach**—On the Eisenach is found a frame of which the side rails are straight, being 38 in. wide, 7 in. deep at center and tapered toward each end. Pressed steel is used, and there are six cross members with integral gusset plates. This truck is a 4½-ton chain drive with four-point suspended engine and transmission.

**Benz**—The Benz 4½-ton chain and 3½-ton shaft-drive trucks have somewhat similar frame layouts, that of the heavier model being shown in the sketch.

The maximum depth is 6 in., tapering to the front, which is also narrowed. The rear width is 35 in. The engine on both models is three-point suspended, the front support is bolted to a cross member through a spring, while the rear supports are rigidly bolted to the adjacent cross members. The transmission in the case of the 4½-ton model is three-point suspended through coil springs to cross members of frame. On the 3½-ton shaft-drive model this suspension is from four points on cross members.

**Bussing**—The 4½-ton chain-drive Bussing employs a rolled channel steel frame with six cross members and a strap-iron truss, as shown by sketch. The depth of the channel is 5 9/16 in. The width of the frame, whose side rails are parallel, is 38½ in. The engine is supported by sub-frame through three arms on each side of crankcase, the transmission having three-point suspension. The frame layout of this model is sketched, and the frame of the 2½-ton shaft-drive Bussing is very similar.

## To Whom Credit Is Due

UPON returning to town after a month's vacation, in which I have been indulging since receiving my discharge from the army, I notice that you have commenced the publication of the series of articles which I am preparing on the German Motor Transport, and I would like to make a more definite statement as to whom credit is due for this work than appeared in the introduction to the articles.

The first Director of the Motor Transport Service, as it was designated when the activities of the several staff departments having to do with motor transportation were consolidated under one head, was Colonel Pope of the cavalry, attached to the staff of the Chief Quartermaster. After the establishment of the Motor Transport Corps had been authorized, General Walker of the Engineers was designated as Director, Col. Pope becoming Deputy Director.

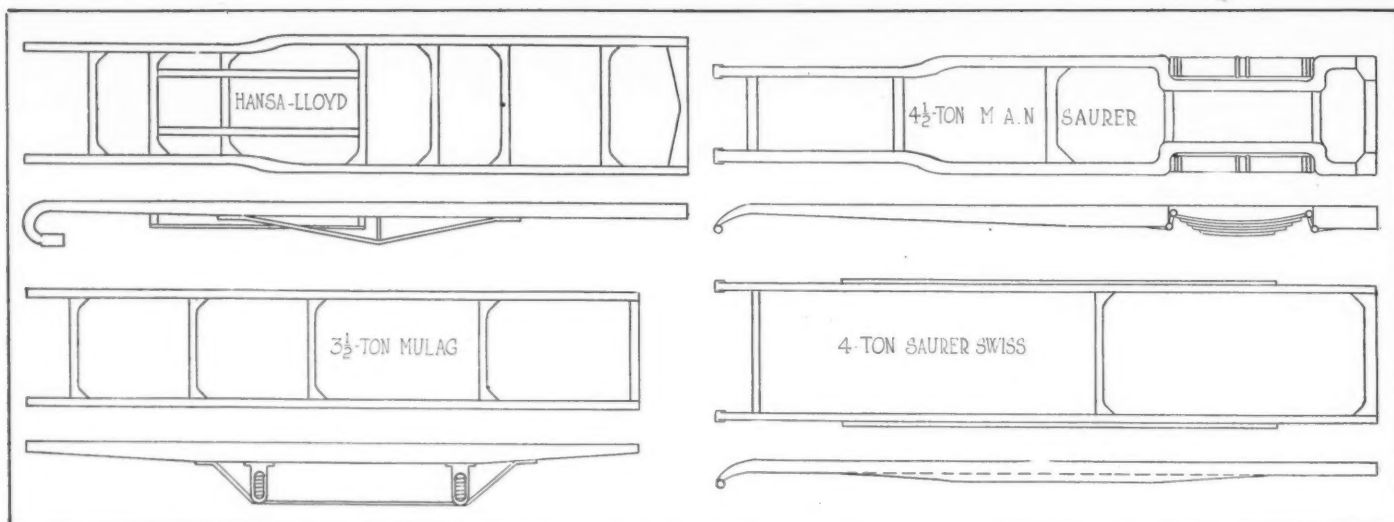
My status was Chief of the Engineering Division and I wish to take this occasion to express my appreciation of the confidence and support which these distinguished officers gave to my efforts to develop a practical and useful engineering organization in the Corps. When I was assigned to the Armistice Commission, the Engineering Division was placed under the direction of Lieut.-Col. Mackie (S. A. E.), who

from that time devoted much attention to the collection of statistical data on the performance of the various makes and types of vehicles in the A. E. F.

In connection with the receiving of the armistice trucks from the German Armies, this work was most ably carried out, in accordance with the plans, applicable to all the allied armies, which had been prepared by the Armistice Commission, by Major Pateman under the direction of the Third Army Headquarters, he having been sent from the Advance Section S. O. S. to Coblenz for this duty. His co-operation in many directions, including the assigning of personnel from one of his detachments, for the road testing and mechanical examination of the trucks as they were being selected for the collection, was one of the factors which enabled a satisfactory and representative collection to be made.

The technical catalogue of the vehicles from which these articles are being prepared is very largely the result of the able administrative assistance of Major Jennings (S.A.E.) of the Operations Division, M. T. C. Headquarters, who accompanied me on the expedition into Germany and proved his capacity for overcoming obstacles and getting things done.

LIEUT.-COL. ARTHUR J. SLADE.



**Hansa-Lloyd**—A very rigid frame is found on the Hansa-Lloyd. It consists of 5¾-in. pressed channel side rails tapered and drawn in at the front end, the rear end being 41½ in. wide. Eight cross members with integral gussets are provided, in addition to which there is a flat truss rod running from a point at the rear of the engine to a point just in front of the jack-shaft bracket, with a tension adjusting screw in the center. The engine is supported by the second cross member from the front and by the subframe, which also carries the transmission. This is one of the most elaborate frames found on any of the trucks, as will be observed from the sketch.

**Mulag**—A truss rod with spring members is a noticeable feature of the Mulag 3½-ton chain-drive truck. This rod runs from the rear hanger of front spring to a point on the frame above the rear axle, and, as will be seen from the sketch, the compression members of the truss are coil springs.

Otherwise the frame consists of straight side rails, tapered at the ends and 6 in. deep at center. The width is 35½ in., and five cross members are employed, the engine being carried by a three-point suspension.

**M. A. N. Saurer**—On the M. A. N. Saurer, built at Nuremberg and rated 4½ tons, the pressed-steel frame, 8 in. in depth, has an abrupt inward offset for the rear springs, as shown in the sketch.

Frames similar to this have been seen on Swiss Saurers imported into this country. On the Swiss Saurer in this collection, however, the frame rails are of rolled channels, 4¾ in. in depth, reinforced with a ¾-in. plate, 7½ in. deep at center, and tapered at the ends and riveted to the

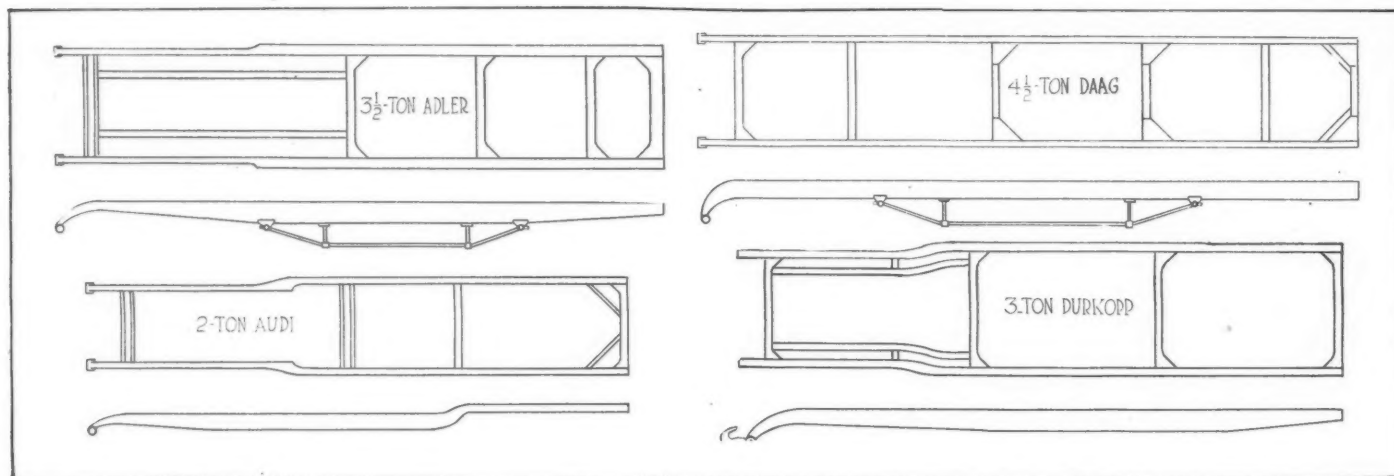
outer side of channel rails. The frame width is 39¼ in.

**Adler**—The frame of the Adler 3½-ton chain-drive truck is of pressed steel channel, tapered at each end and with reduced flange width at forward end, as shown in sketch.

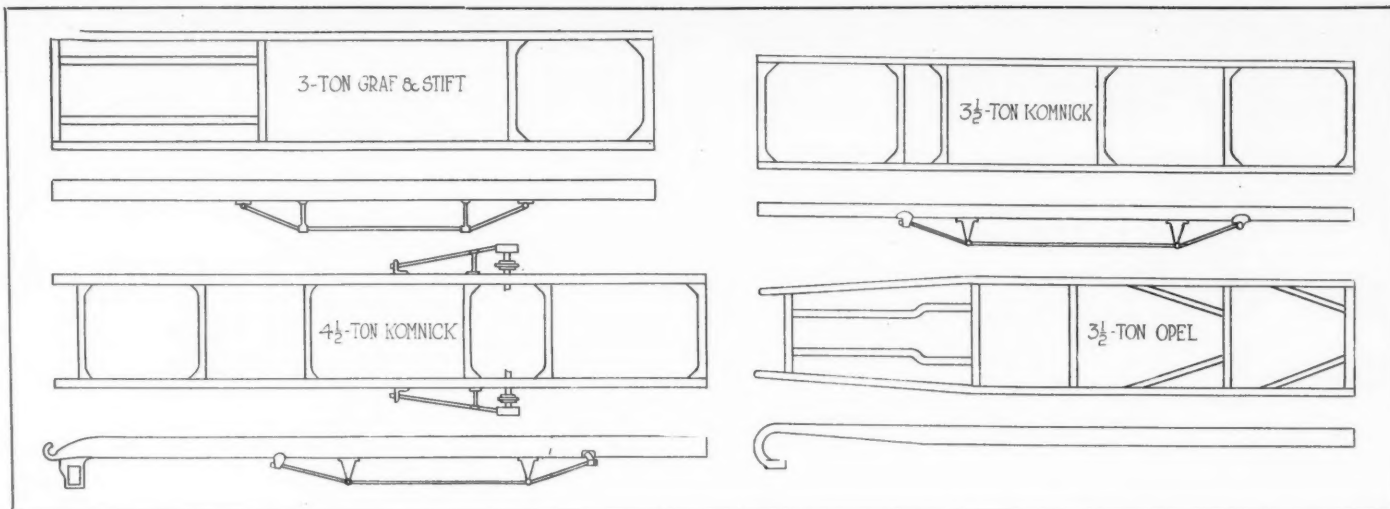
This frame is trussed and carries a subframe for the rigid mounting of engine, clutch and transmission. Several train loads of new, unused Adler trucks were shipped into Coblenz to complete the quota of vehicles required under the armistice conditions after all of the available used vehicles had been submitted for acceptance. It can, therefore, be considered as one of the standard types used by the Germans in considerable quantities.

**Audi**—The Audi, a light 2-ton vehicle, equipped with a Red Cross body, had synthetic rubber tires, and was included in the collection because, though it showed signs of very severe service, it was in good running order. It had an interesting engine, as well as other features worthy of study. It was operated daily in connection with the work of assembling the collection and became a great favorite among our drivers. Its pressed steel frame is shown in the sketch. The engine is supported at four points, and the transmission at three.

**Daag**—The frame of the Daag 4½-ton chain-drive is of a 6½-in. pressed steel, channel side-rail construction with truss. Five cross members are provided, the two in front being castings forming the engine supports, the latter being three-point suspended. The remaining cross members are pressed steel, but with separate gusset plates. The rear springs are carried at the rear by a cross tube attached to bracket under frame, the width of which is 38 in.







**Durkopp**—The Durkopp frame of pressed steel,  $7\frac{1}{4}$  in. deep at center and tapered at ends, has a subframe which parallels the side rails at the forward end, where same are narrowed in. This subframe carries both engine and transmission, which are four-point suspended.

**Gräf & Stift**—A truck bearing the name of Gräf & Stift, made by the Wiener Automobil Fabrik, Vienna, a  $3\frac{1}{2}$ -ton chain-drive, was the only one of this make delivered. Its frame is a  $6\frac{1}{4}$ -in. pressed steel straight channel with trusses. A subframe, running under the crankcase for the four-point suspension of the engine, is carried at the forward end by the cross member in front of radiator and at the rear end by a cross member placed between crankcase and flywheel.

**Komnick**—The Komnick  $4\frac{1}{2}$ -ton chain-drive truck shows a straight side-rail frame, tapered at the front, and, in addition to the truss, is provided with a strut on each side running to outer end of jack-shaft as indicated.

A  $3\frac{1}{2}$ -ton chain-drive Komnick has a similar frame except that it has no jack-shaft strut.

**Opel**—On the Opel  $3\frac{1}{2}$ -ton chain-drive is found a frame having more elaborate diagonal bracing than usual, and a subframe with offset members by which the engine is supported at four points.

From the foregoing brief descriptions of frame constructions it will be seen that there is no apparent tendency toward uniform frame design. The vehicles which have not been referred to in this article show similar variations in frame widths, tapers, offsets, location and shapes of cross members and braces, truss rods and subframes. In practically every case little, if any, consideration seems to have been given to cost of production, either on a limited or quantity basis.

It is, furthermore, not apparent that any substantial advantage has been gained in any particular design by reason of using frame members which differ only enough from those used in other designs to make necessary special dies, with correspondingly increased expense. In this respect, the German state of the art is not as far advanced as in the American industry.

## Optical and Radiation Pyrometers

**E**XPERIENCE with radiation pyrometers has not been particularly favorable to their use, largely, perhaps, due to the conditions in a steel works being hardly suitable for their employment. There is a certain inherent time-lag in taking readings. It is true this may be minimized by proper manipulation, but the conditions are often such that only a matter of two or three seconds is available for the reading. Another trouble is due to the unequal heating of the instrument itself by radiation from the furnace, which affects the zero. This type of instrument has, however, the advantage of being direct-reading, that is, it does not require setting by the operator for each reading.

As between the two principal types of optical pyrometer, namely, the polarizing type and the disappearing filament type, we have tried them side by side, and our experience is in favor of the former. With the same amount of care both types of instruments give equally accurate results. The polarizing type, however, has no inherent lag, a reading being obtained as soon as the operator can make the adjustment. The disappearing filament type requires a certain interval of time for the lamp filament to acquire the temperature corresponding to the current which is put through. The polarizing type also has the great advantage of possessing a definite physical law, which may be ex-

pressed mathematically. This facilitates and checks the calibration, especially if a calibration chart is made use of. A resulting advantage is that extrapolation to higher temperatures is more accurately carried out by following the same law.—*The Engineer.*

## Saving the Eyes

**A**N effective method of counteracting the hot weather inclination on the part of workmen to discard goggles has come to the attention of the National Safety Council in the plant of one of its members, the Aluminum Castings Co.

This company found that on hot days many workmen were tempted to lay aside their goggles when the lens became clouded from perspiration. To eliminate this dangerous practice the firm gave the men neat wiping cloths, about 4 by 6 in., which may conveniently be carried in the goggle case. Each cloth carried the printed message: "Use this cloth to keep your goggles clean" and a safety slogan, of which the following are examples:

"Goggles save your eyes."

"Goggles are to protect your eyes—not your cap."

"You can't see with a glass eye—wear your goggles to-day."

"Take care of your eyes—your goggles will do it."

"What would you take for your eyes? Think it over."

# Aircraft Magneto Adapted to Four Cylinder Car

This British war product shows several rather radical departures from accepted types and eliminates much of the human element in the assembly. Condenser mountings are different and originality is asserted in the use of laminated pole shoes. Machine is practically waterproof.

A BRITISH firm established in the early days of the war for the manufacture of aircraft magnetos has standardized a four-cylinder car magneto having several interesting features of design.

In the first place, aluminum enters very largely into its construction, for the distributor end plate, the base, and an extension enclosing the armature are cast in one piece from an aluminum alloy. The distributor cover and the driving end plate are also of aluminum.

The machine, as a whole, is made waterproof without the use of felt packing strips and irrespective of the fit of the one-piece magnet. While the machine could not be immersed indefinitely without some water entering, the parts are thoroughly protected during use in a rain-storm or when passing through a watersplash or ford.

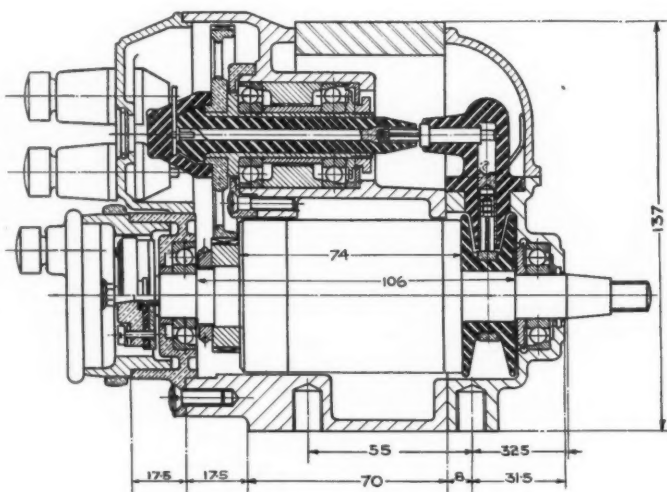
A feature which the makers claim to have originated is the use of laminated pole shoes. The laminations consist of sheet steel plates, the adjacent surfaces of which, during the course of erection, receive a coating of shellac. The laminations are held together by long rivets, applied in an electrical riveting machine, which brings the rivets to a high temperature before burring the ends. The advantage claimed for the laminated pole shoes is that they result in reduced weight and increased efficiency. The writer has seen one of these machines with the armature running at 35 r.p.m. giving a 5.5 mm. spark in open

air with unfailing regularity. This is a very low speed.

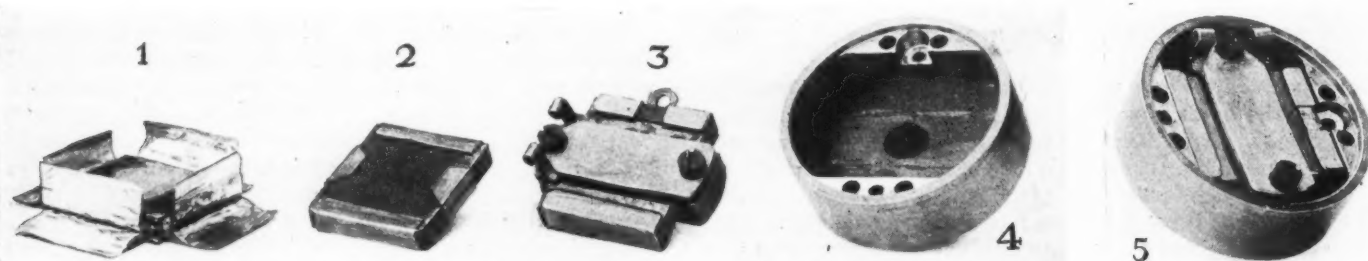
It is, perhaps, in the design of the condenser that the new M-L magneto differs most strikingly from contemporary and past designs. In the usual system of construction, introduced by Bosch and copied, perhaps rather slavishly, by magneto manufacturers in most other countries, the tin foil sheets are punched out to a special shape, each with a projecting lug, while the mica sheets are formed to a similar shape but without the lug. In course of assembly alternate lugs of the tin foil stand out from two opposite sides of the mica insulating sheets, and as a considerable difference of potential exists between each set of lugs they must be insulated from the condenser casing and from one another. In the Bosch design, therefore, the actual condenser as a whole is fitted into its case—the end plate of the armature—packed in a flexible insulating material. This system, the M-L Magneto Syndicate, Ltd., maintains, does not provide a satisfactory and mechanical construction, nor does it

lend itself to standardized production, for the human element enters largely into the placing of the insulating packing.

During the war, therefore, the M-L Syndicate designed the condenser which has now been adopted for its car magnetos. It consists of eighty 1¼-in. square sheets of mica alternating with plain rectangular strips of tin foil, 2 x 1 in. The strips project beyond the sides of the

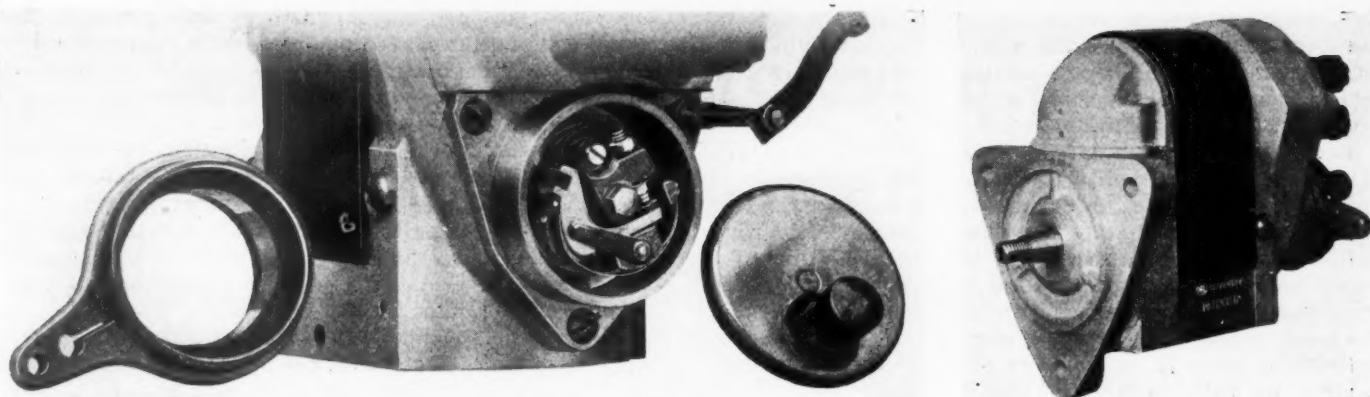


Section of the M-L magneto



Condenser units of M-L magneto. (1) The pack of mica and tin foil sheets, with the outstanding ends of the latter ready for trimming and bending back over and above the pack. (2) The pack with the ends trimmed and bent over. (3) The condenser in its carrier, with bridge pieces and clips of the earthed potential. (4) The casing, which also forms the armature end plate. (5) Condenser in its casing





*On left—Cam ring removed to show cam design. Cams are formed by grinding two indentations in a continuous ring of metal. Cam ring is spigotted in a bronze extension of the aluminum end plate, so that no overhang occurs. On right—Magneto of the flange fixed type*

mica, the various layers being coated with shellac before being brought together. Each strip of tin foil is laid at right angles to the one before it, and the four outstanding sets of ends form lugs which are divided and bent back over and above the pack. Two opposing sets, i.e., a pair of the same potential, are, after being trimmed, pressed into a metal carrier and secured there by bridge pieces held by two screws, while the two sets of the second potential are held by U section metal clips.

The carrier with the condenser is then inserted into the armature end plate, from which it is insulated by two simple discs or washers of insulating material. The clips holding the tin foil ends of the second potential are a tight press fit in the casing, and, therefore, in firm metallic contact with it; they are thus "grounded," the condenser as a whole being secured by a screw passing through a tongue bent back from one of these clips. The connection between the insulated set and the armature winding is made by a wire, which runs from terminals on the bridge piece of the carrier.

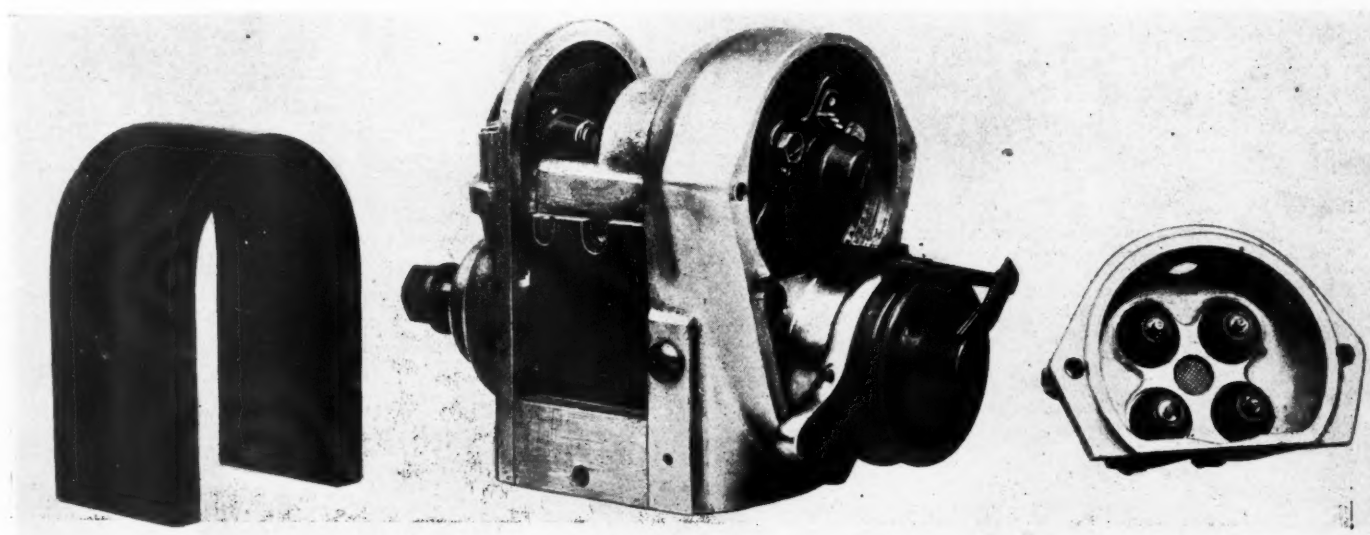
It will be realized that this design enables the condenser to be made on strictly mechanical lines. Jigs are used to secure uniformity of size as to all dimensions, while the human element hardly enters into the process of assembly, and, with the exception of the two washers between the carrier and the end plate, no insulation beyond the mica strips enters into the construction.

Another feature of this machine in regard to which,

however, it does not stand alone, is that it embodies a distributor of the air-gap type. The rotating member does not actually make contact with the insulated high-tension terminals in the aluminum distributor cover, but the current is compelled to bridge the 0.008 in. space between the two parts. The carbon brush and the embedded metal segments of the usual arrangement are thus eliminated, and, with them, a source of wear and a frequent cause of trouble—"tracking," i.e., the deposit of carbon on the surface of the insulation.

The high-tension terminals projecting into the distributor case consist of brass pegs in sleeves of insulating material, while the carbon brush is displaced by a flat segment of metal projecting from the rotor at right angles to its axis. Attached to the half-time distributor pinion is another segment of brass with serrated edges, and the space between this and the distributor segment forms the safety spark gap.

In the design of the contact breaker or interrupter mechanism several variations from standard practice are to be found. In the first place, the cams and the cam ring consist of an integral and continuous ring of steel, the cams being formed by grinding two indentations on the inner periphery of the ring. The cam profile is thus very unusual, for not only are the platinum points kept apart for a comparatively lengthy period, but the break and make are very gradual, almost deliberate. It is claimed for this design that it eliminates the flinging out of the rocker



*Magneto with the one-piece magnet and the distributor cover removed. Note laminated pole pieces and air-gap distributor*

arm, which results in erratic firing at high speeds and has been known to cause the arm to fracture, while the more gradual and deliberate coming together of the contacts reduces the hammering action and the consequent rapid wear of the platinum points.

The cam ring, which carries an operating lever adjustable to the best position to suit the control rods, is piloted in a bronze extension of the aluminum end plate. This pilot bearing immediately surrounds the cams, so that the liability for the cam ring to tip and wear unevenly, which occurs in the usual design by reason of overhang from the pilot bearing, has been removed. By forming the cams in one piece with the ring, it is maintained that the risk of error in assembly is reduced, and there is no liability for them to become loose in service.

One other interrupter improvement may be mentioned, and that is the use of an insulating material for the rocker spindle bush which is unaffected by moisture or dampness in the atmosphere. It is therefore claimed that the rocker will not operate sluggishly nor stick entirely in damp weather, as is frequently the case when a fiber bush is employed.

A type of magneto which requires no bracket on the crankcase to support it is coming into considerable favor with certain British car manufacturers. It is known as the flange fixed or spigot type, and was evolved for radial engines for airplanes. One of the accompanying illustra-

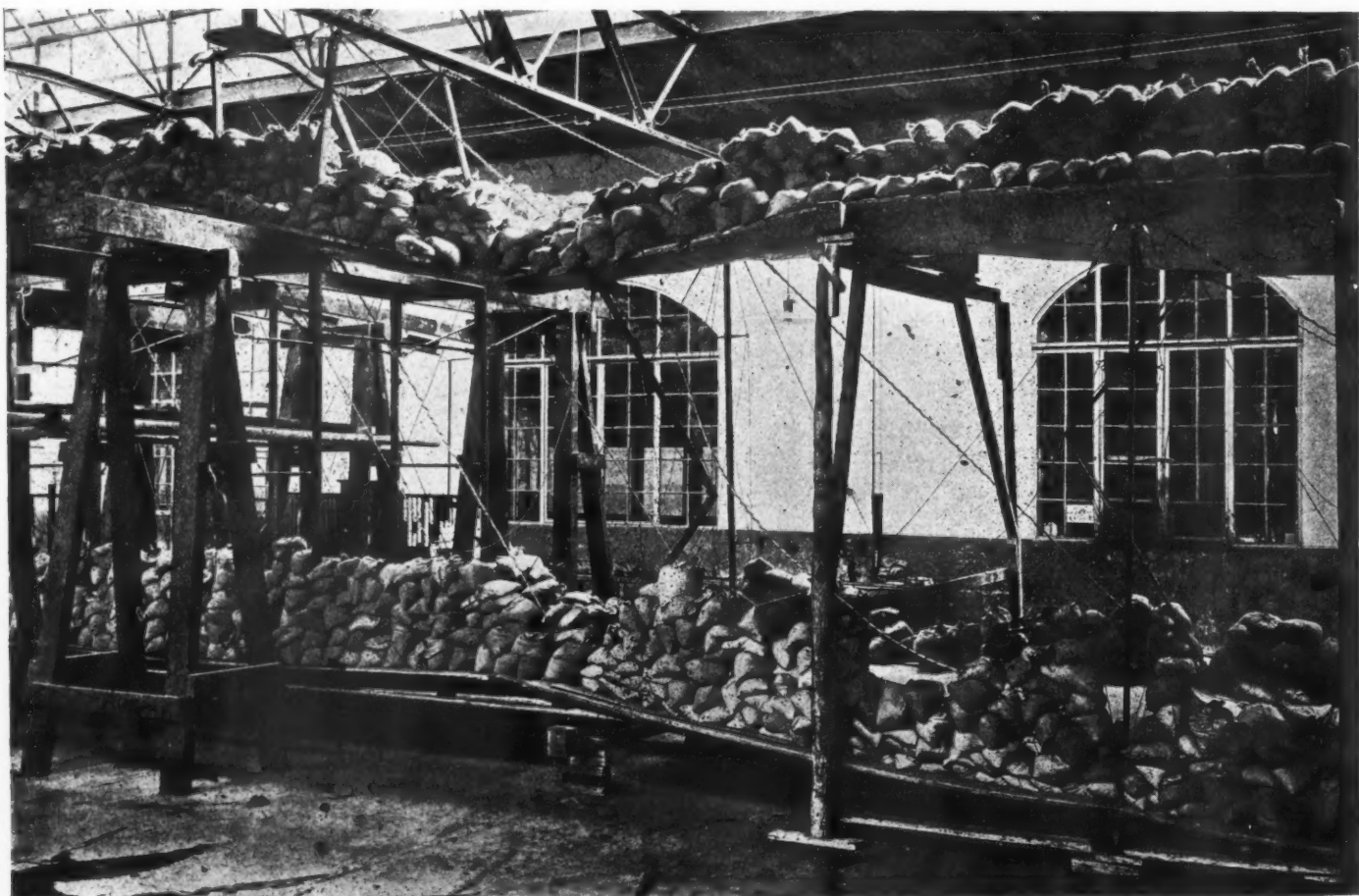
tions shows an M-L car magneto of this pattern. The driving end plate is cast in one piece with a large triangular flange having three bolt holes and a pilot which registers with a hole formed in either the back or side of the distribution case. When a separate chain is used for the drive, or in the case of a gear distribution, the armature shaft frequently carries the sprocket or gear pinion; but, owing to the irregularities and harshness of the drive when one chain serves for the camshaft and the magneto, a sleeve coupling is then advisable between the magneto sprocket and the armature, the sprocket being supported on each side in a plain or ball bearing.

Advantages claimed for this type of fixing are that a flexible coupling is not needed, the drive is always in alignment, the cost of the bracket is eliminated, and a more compact drive is obtained.

Unless a sleeve coupling is used, however, it is not an easy matter to reset the timing, and this usually involves detaching the front cover of the distribution casing in order to get at the chain sprocket or gear pinion.

It is a cheaper fixing, however, from a production point of view, and for this reason it will probably be found on a great many British cars at the next Olympia show, though it is doubtful whether the public will appreciate the development; except in the case of very small engines, where the saving of space is an advantage, this kind of magneto support has not much in it appealing to the user.

## A Static Test of Airplane Wings—Load 38 Tons



*This test was made in the Fiat factory on the wings of the 1000-hp. airplane built by that company*



# Aircraft Engine with Steel Liners in Aluminum Cylinder Blocks

It was the custom of the British Ministry, during the war, when an engine was needed for special service, to ask the engine makers to design a motor to meet these requirements. It was such a request to the Siddeley-Deasy Motor Car Co. for an engine of greater horsepower for aircraft work that resulted in the Puma, a six-cylinder vertical type with an output of 260 hp. at 1500 r.p.m.

TOWARD the end of 1916 the Royal Flying Corps began to feel the need of an aircraft engine of larger horsepower than they were then using. Trials had already been made with an experimental airplane known as the D.H.-4 fitted with a six-cylinder engine of rather more than 200 hp., and these trials were so successful that the demand for an engine of about this power that could be produced in large numbers became acute.

It was then that the Siddeley-Deasy Motor Car Co. was asked by the Ministry to undertake the production of an engine in large numbers to meet this demand, and it was at first suggested that an engine similar to that used in the experimental airplane should be manufactured.

## Design Started in January, 1917

For many reasons this was found to be impossible, and finally the Siddeley-Deasey Co. was asked to prepare designs for an engine on similar lines. The design of the Puma engine was started in January, 1917. The experimental engine was made and completed in March, and the trials were successful. Some further modifications were made in the engine to insure a rapid production, and quantity production was begun. The engine first began to appear in quantity in the late autumn, and the output gradually grew, until in October, 1918, the last complete month before the armistice, no fewer than 625 complete engines were delivered, and in addition a very large quantity of spare parts.

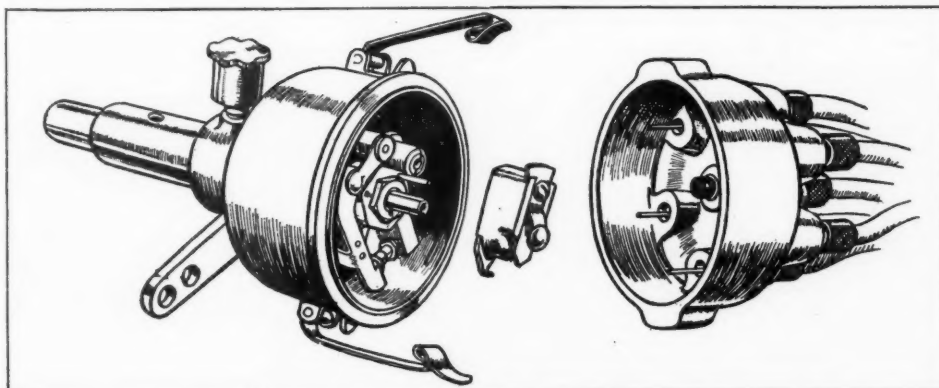
The Puma engine has six vertical cylinders of 145 mm.

bore by 190 mm. stroke (5.7 x 7.5 in.) and follows conventional practice in its general arrangement. The valves are in the cylinder heads, and are worked by an overhead camshaft. This type of engine was chosen, as it was necessary to make an engine which could be looked after and maintained by mechanics who did not possess very great skill or experience. As the airplane for which this engine was originally intended had to undertake long-distance bombing raids, reliability was absolutely essential.

## Cylinder Construction

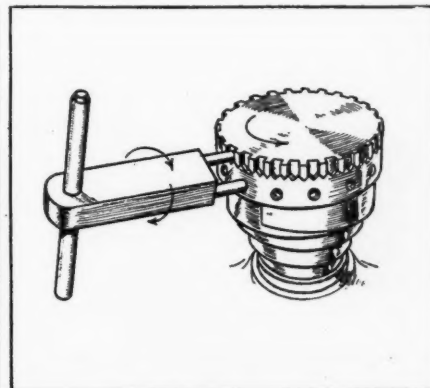
The chief novelty of the engine lies in the construction of the cylinders, which are in two blocks of three. The cylinder heads carrying the valves are made of a casting of an aluminum alloy into which liners are shrunk and screwed to form the cylinder barrels. This is a process requiring great care, and a special plant was installed to insure that the cylinder heads were kept at the right temperature while the screwing-in operation was done. The cylinder is completed by an aluminum jacket, which is held by means of a flange joint to the cylinder head, and which makes a watertight joint with the barrel by means of a gland with rubber packing.

In view of this method of manufacture, which yields great strength combined with lightness, it is impossible to guarantee that the base flanges of the cylinders when screwed home are lying in exactly the same plane. To enable them to be accurately bedded down upon the crank



The Remy Contact Breaker with the "Bakelite" distributor block removed

Sketch of the inside of the Remy distributor cover, showing the ring of insulated steel pins



Method of adjusting the valve clearance by means of a special tool

chamber, they are, when in position, trimmed on a surface grinder, and in consequence of this fact the holding-down clamps have to be fitted individually, and the latter must, in the event of the engine being disassembled, be replaced in their original positions. For the purpose of replacement each cylinder unit—that is, the three cylinder-liners with their common waterjacket assembly—must be regarded as inseparable.

At the base of the cylinder, and between it and the crank chamber, light steel sleeves are fitted to locate the cylinders. For this purpose No. 3 and 6 sleeves fit the cylinder bore, while Nos. 1 and 4 locate the cylinders laterally, allowing for slight tolerance in cylinder bore centers, but without affecting the alignment of the camshaft.

#### Die-Cast Aluminum Pistons

The pistons are die castings in aluminum, with cross webs to enhance their heat conductance. The hollow piston pin is so mounted as to be free to turn in its housing in the piston, any end play beyond a suitable maximum being resisted by a spring clip at each end, which when pinched up is inserted into the housing and allowed to expand there into an annular groove, into which it is only forced the harder when brought into contact with the end of the piston pin.

In addition to being free to move in the piston bosses, the piston pin is also loose in its phosphor bronze bush, which in turn "floats" in the small end of the connecting rod. The bush is perforated with holes, which insure thorough lubrication of all working surfaces, a supply of oil being maintained through a large hole at the top of the connecting-rod small end.

The valve seats are of a special quality bronze, and are expanded into the cylinder head, after which they are machined in position.

Each cylinder is fitted with three valves, one large inlet and two smaller exhaust valves. The inlet valve, of nickel steel, is worked by a rocking lever, actuated by an overhead camshaft. The exhaust valves are worked direct from the camshaft, the cam striking an adjustable flat-topped cap which is fixed to the valve itself. The exhaust valves are made of tungsten steel, very similar in composition to that used for high-speed tool steel. It is stated that grinding-in is scarcely ever necessary, as tests have shown that full power can be maintained for periods of 100 hr., although the valves have not been touched. The inlet valve has a clear diameter of 65 mm., and the exhaust valve diameter is 42 mm.

The timing of the valves is as follows:

Inlet opens 7 deg. after top dead center.

Inlet closes 43 deg. after bottom dead center.

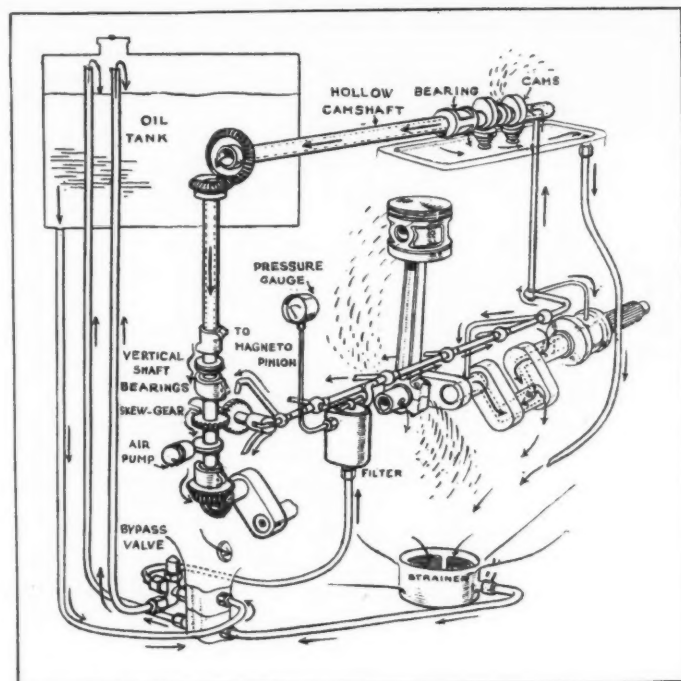
Exhaust opens 58 deg. before bottom dead center.

Exhaust closes 12 deg. after top dead center.

All the valves are operated by a single camshaft. It is supported in four large bearings carried in a casing which forms a complete protection for the whole of the valve gear, as well as providing a bridge over the cylinder heads which rigidly locks the blocks together. The camshaft casing is registered upon the cylinder by means of hardened steel dowel bushes, into which four of the holding-down bolts are screwed.

The camshaft bearings are carried in tunnelled housings bored in the casing, and are located therein by set screws. Both shaft and bearings are capable of being withdrawn endwise.

The shaft is driven through two trains of bevels, the upper pair of which are contained in the camshaft casing, which also serves to support the Remy ignition distributor. The vertical shaft between the two bevel trains serves the secondary purpose of driving the magnetos through a skew gear, the air pump, and through an extension of



Sketch showing oil circulation of the Siddeley "Puma" engine in semi-diagrammatic form

the shaft below the crankshaft the water and oil pumps. Through a third bevel are driven the speedometer and the machine gun interrupter gear.

At its forward end the camshaft is furnished with an extension which drives the distributor valve of the engine starter, when the latter is fitted.

#### Crankcase Unit

The cylinders are counted on an aluminum crankcase, which carries a very substantial hollow crankshaft mounted in 7 white metal bearings. The lower half of the crankshaft is not intended to carry a supply of oil, and is fitted with a deep trough from which the oil is collected and returned to the oil tank. On the front of the crankshaft is mounted a propeller hub which is driven by means of serrations so arranged that the hub can be mounted in one position only. The propeller hub carries pointers which indicate on markings on the engine base the position at which the valves should open and close, thus making the adjustment of the valves an easy matter. All crankshaft bearings are 72 mm. in diameter and are bored out to 54 mm. The crankpin bearing is 70 mm. long and each of the main bearings 42 mm.

The caps of the two end main bearings are formed in one with the lower half of the crank chamber, while those of the intermediate five are carried in caps supported entirely by the upper half, by means of bolts which also serve the purpose of holding the cylinder blocks in position. In addition to the plain bearings above mentioned, there is a roller-bearing supporting the forward end of the shaft.

The caps of the intermediate journal bearings are of aluminum, stiffened with webbed keep-plates of steel. The upper half also carries the eight supporting feet of the engine, in addition to the main lubrication filter and two breathers.

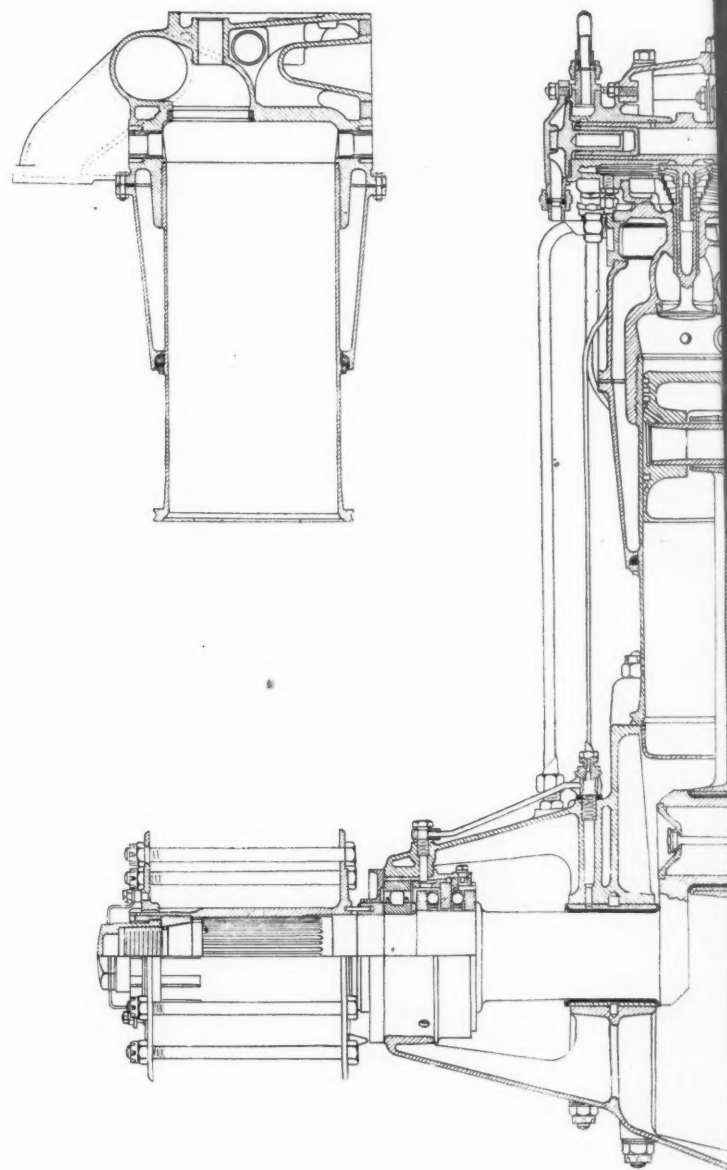
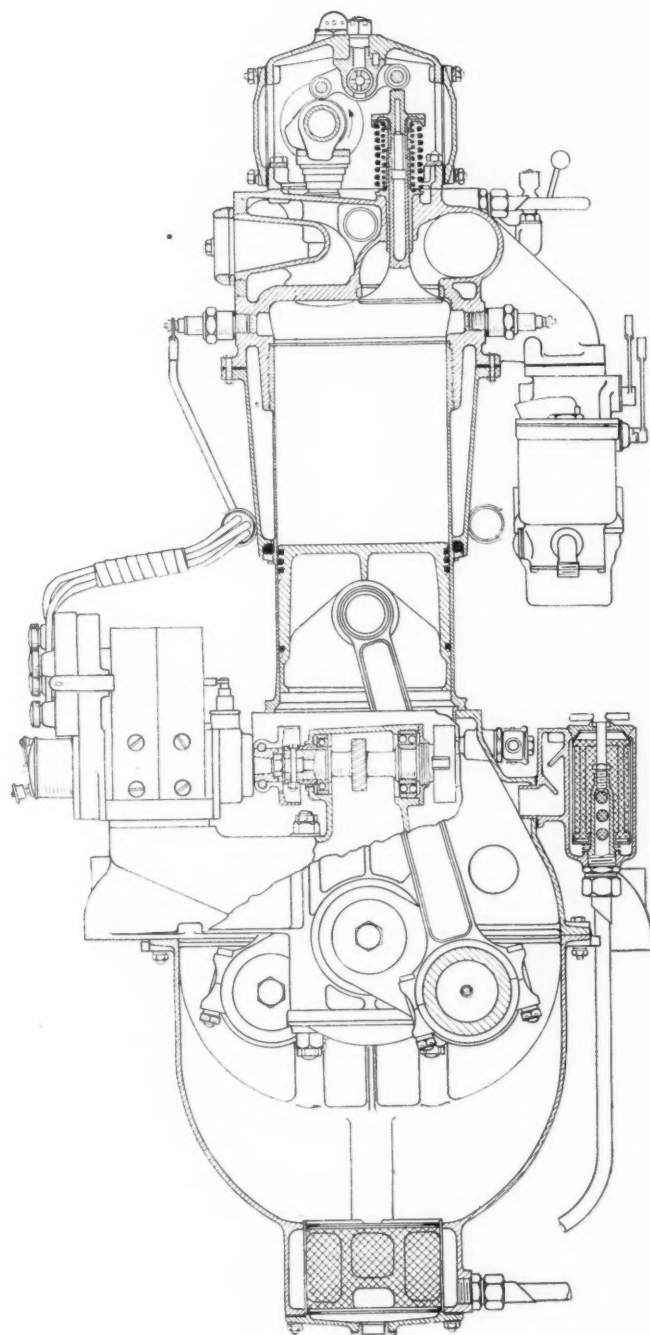
#### Lubrication

The lubricating oil is contained in a tank which is separate from the engine, and which feeds the oil pump. From this pump the oil is forced to all the main bearings of the



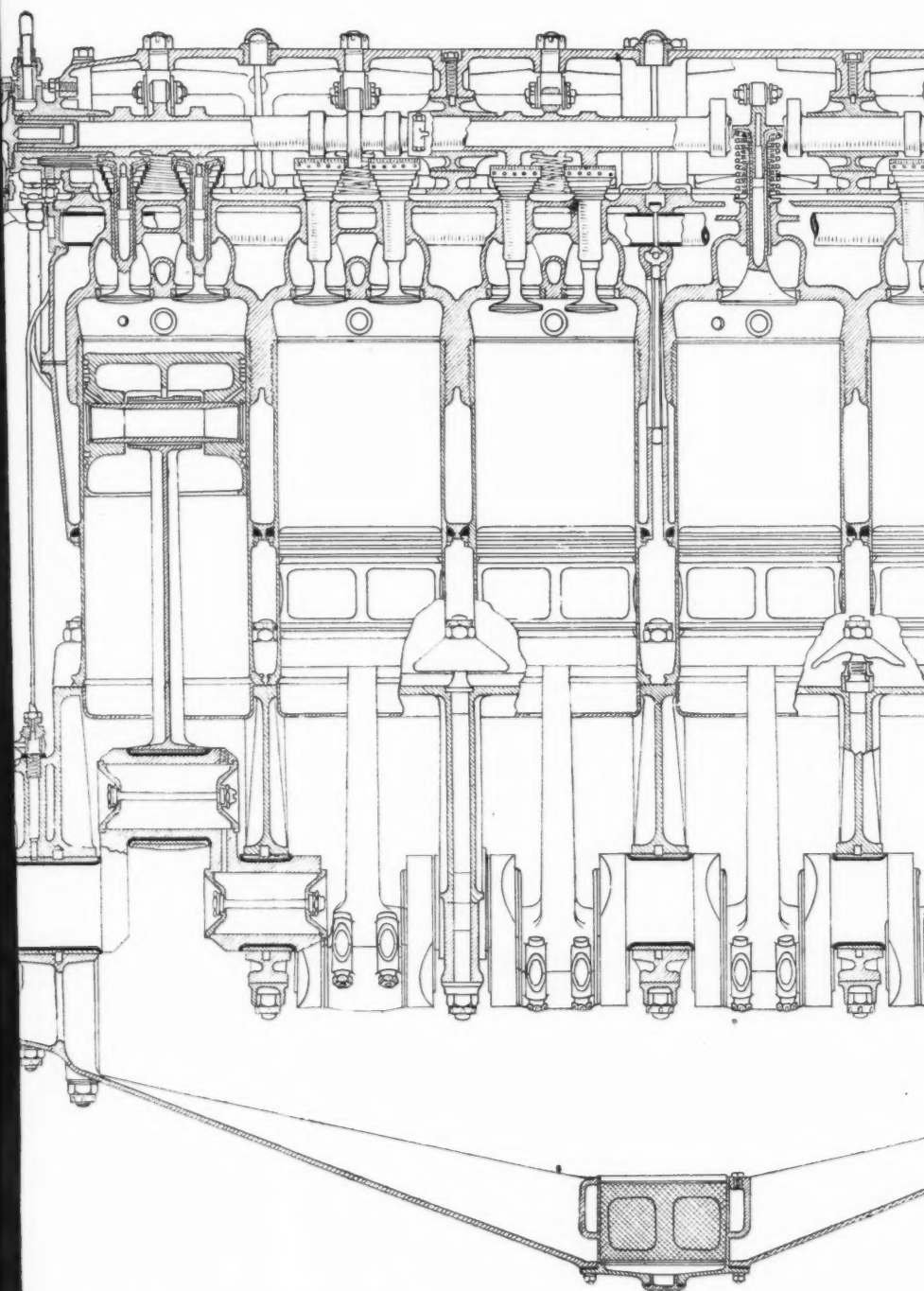
## Cross-section, Cylinder Detail and Long

**T**HIS British aircraft engine embodies some of the features of aluminum in the cylinder structure and the direct operation of stroke of 7.5 in., and the output is 250 hp. at 1500 r.p.m. Valve seat by the dry sump method.



## d Longitudinal Section of the Pump

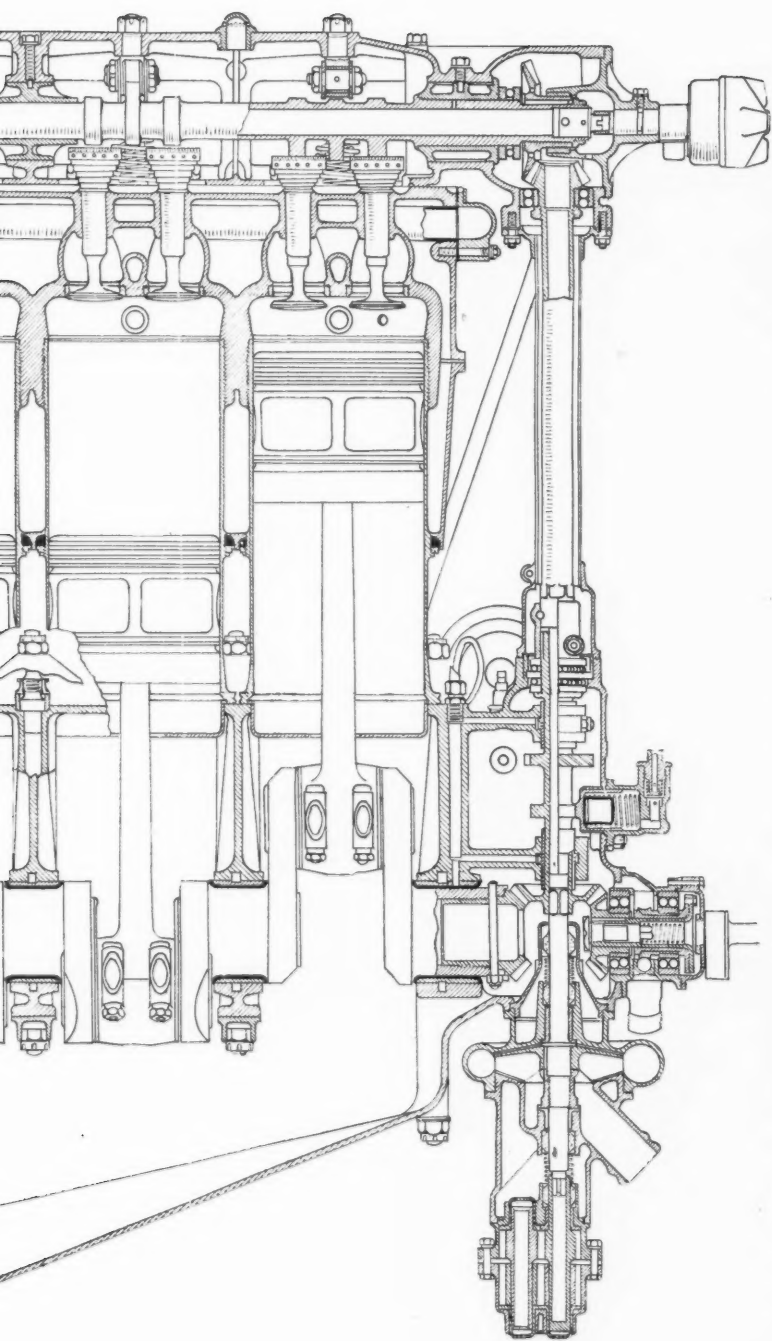
*he features original with the Hispano-Suiza, notably the combination of steel and  
ect operation of the overhead valves from the cams. It has a bore of 5.7 in. and a  
p.m. Valve seats of bronze are expanded into the cylinder heads. Lubrication is*

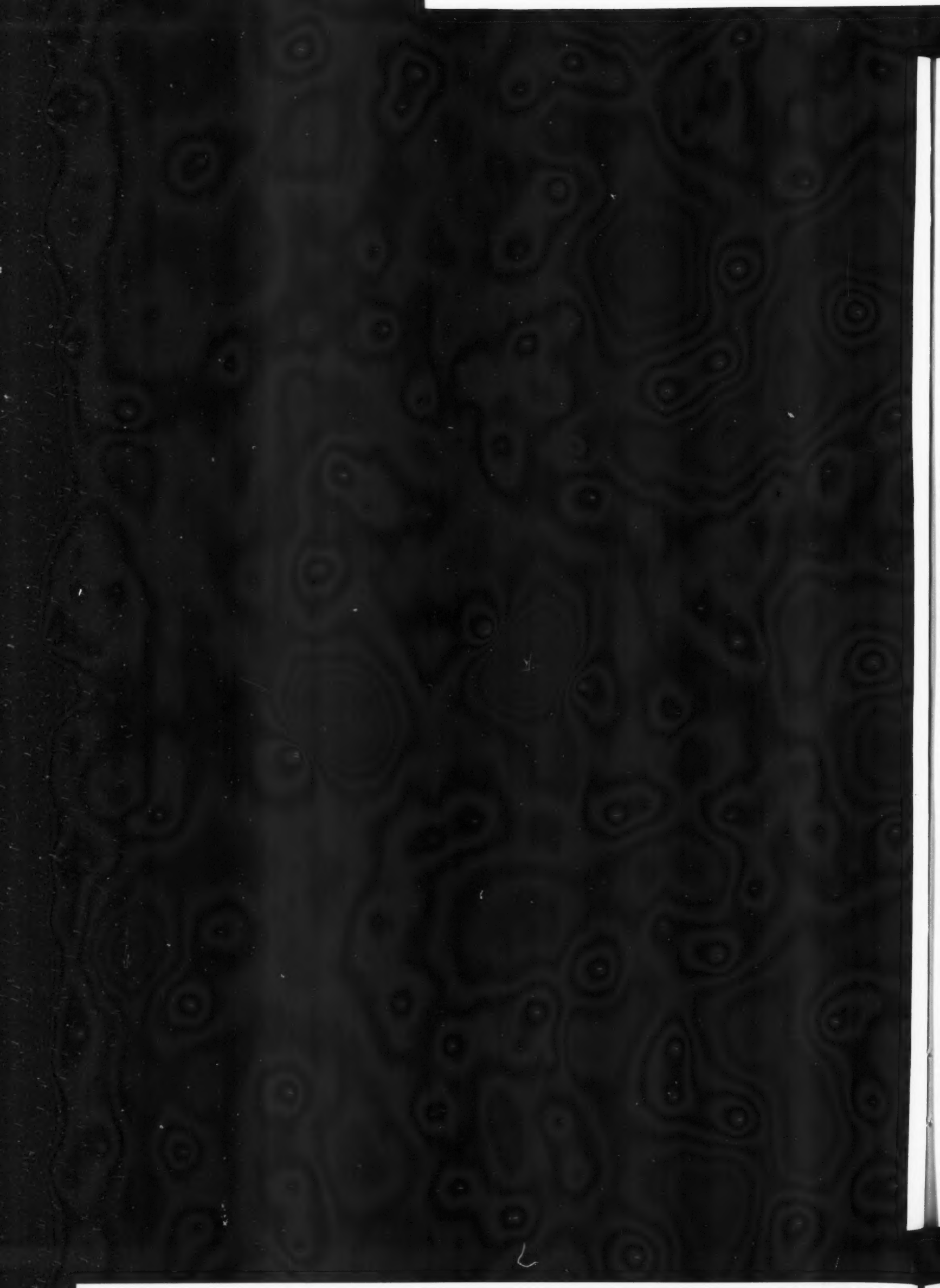




# Puma Engine

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crankshaft, whence the connecting rod bearings are supplied through holes in the crank web; oil is also supplied to the various gears and the overhead camshaft. A spring by-pass valve adjustable from outside of the engine is provided, so as to keep the pressure of the oil constant.

After the oil has performed its duty in lubricating the engine, it drains back into the lower half of the crankcase, from which it is sucked by another oil pump of larger capacity, and is pumped back into the main oil tank. The oil is filtered both before it goes into the engine and before leaving it. Particular care has been taken so that while all the parts of the engine receive ample oil, as little as possible escapes into the combustion space. A special form of scraper ring is fitted to the pistons to effect this purpose, and the result is said to be so successful that the engine will run for long periods without carbon forming on the piston top, while the spark plugs give little trouble through oiling up. Carbonization is also prevented to a large extent by the use of aluminum alloy pistons.

The engine is fitted with two entirely separate ignitions. These may either be two separate magneto systems or one magneto and one high-tension battery system. In the latter case, the high-tension distributor is driven off the back end of the camshaft.

It has been found in practice that the engines are easy to start by pulling round the propeller and sparking the cylinders with hand-starting magneto, and in cases where this is inconvenient, the engine can be provided with either an air or electric starter.

The air starter consists of a valve fitted to the front end of the camshaft, which distributes the compressed air to all the cylinders. The engine thus acts as an ordinary compressed air motor and will turn at a good speed. As soon as the engine fires, non-return valves in the cylinders cut off the air supply.

The electric starter consists of a small motor driving the engine through a big reduction gear with a special form of clutch. Not counting the battery, the additional weight of the electric starter is about 25 lb., while the air starter weighs an additional 12 lb. without compressed air bottles.

Water is circulated round the cylinders by means of a pump driven by an extension of the vertical shaft that drives the camshaft. On account of the high heat conductivity of the aluminum alloy cylinder heads, overheating is unknown so long as there is water in the system. This enables a comparatively high compression to be used, with its consequent gain in power and efficiency.

#### Carbureter

Two types of carbureter have been used on the engine, which give nearly identical results. These are the Zenith and Claudel-Hobson type H.C.-8. An engine has two carbureters, each of which feeds a block of three cylinders. The carbureters bolt directly onto the engine, and there is an entire absence of copper piping. The induction pipe, which is cast in the cylinder head, is well heated by water, an important point when it is remembered that engines

have to work satisfactorily in the extreme cold experienced at heights of over 20,000 ft.

A small air pump is provided so that it can be used in connection with the fuel supply if desired. This is driven by a cam on the vertical shaft. Provision is made for driving a synchronizing gear used to fire machine guns through the propeller, while a drive is provided for the flexible shaft of a revolution indicator.

#### Installation

The Puma engine was chiefly used in service fitted to the D.H.-9 airplane, which was used for long-distance bombing raids, generally carried out in the day-time. The earlier machines were fitted with engines of medium compression, but later it was found that considerable gain in speed could be made by using a higher compression, particularly when flying at great heights.

The engine has also been fitted to the Bristol Fighter, and it was intended to use airplanes fitted with this engine in very large numbers during the present year.

The Puma engine was fitted to several other airplanes experimentally, notably the F.E.-2B, which is a machine of the pusher type in which the propeller is behind the engine. It has also been used in the DH-10, which is a two-engine bombing airplane, while the Bristol triplane used four of these engines, two in tandem on each side of the pilot.

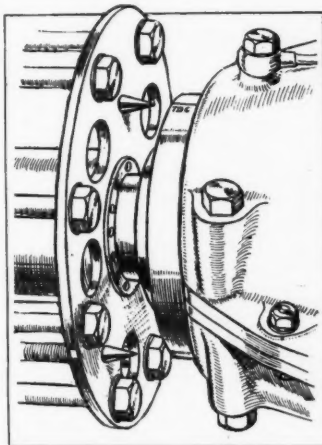
The Puma engine has been subjected to many trials on the test bench, in addition to its work in the air. At the R. A. E. an engine taken at random was run for 180 hours with no involuntary stops. Power curves taken at the beginning and the end of the run were practically indistinguishable.

The average power maintained throughout this period was 249 hp. and the rate of revolution 1600-1700 per minute. In the Siddeley works similar engine tests have been carried out, and the test recorded at the Aircraft Establishment is by no means exceptional.

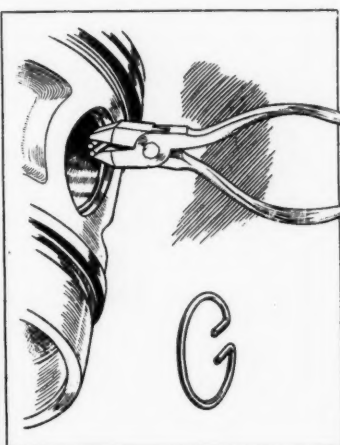
The fuel consumption on test varies slightly with the carbureter setting, but a consumption of .55 pint per horsepower can always be obtained at about 9/10 power. On absolute maximum power the consumption is a trifle above this. The oil consumption in the air is generally about 1 gallon per hour, varying somewhat according to the temperature. The above figures are in Imperial gallons and pints.

#### Leading Particulars of the Puma Engine

No. of cylinders	6
Bore	145 mm.
Stroke	190 mm.
B.hp. at 1500 r.p.m.	260
B.hp. at 1700 r.p.m.	290
Fuel consumption	.55 to .6 Imp. pt.
Oil consumption	.03 to .045 Imp. pt.
Weight, dry	630 lb.
Compression ratio	5.4 to 1
Length over all	1775 mm. — 70 inches
Height over all	1108 mm. — 40 inches
Width over all	612 mm. — 24 inches
Bearer centers	436 mm. — 17¼ inches



Showing how the pointers on the propeller hub are used in conjunction with the marked timing plate on the forward end of the thrust housing



Piston pin clip being removed from the piston with a pair of pliers. This clip expands into a groove and prevents the pin moving axially

# Lighting Plant Capacity Increased to 3 Kw.

New unit designed for Delco line is for use on large estates, hotels and similar plants. It has single-cylinder air-cooled engine with anti-friction crankshaft bearings, direct-connected to six-pole generator. Engine burns kerosene or gasoline and generator is wound for either 32 or 110 volts.

By P. M. Heldt

THE big market for small lighting plants for farm use has to a considerable extent determined the size of the conventional plants, which range in output from  $\frac{3}{4}$  kw. to  $1\frac{1}{4}$  kw. Such a plant gives all the current required for lighting an averaged sized dwelling and barn and for operating electrical domestic appliances, pumps, etc.

However, there are numerous cases where a larger installation is called for, as, for instance, on large estates, for summer hotels, sanitariums, moving picture theaters, telephone plants, etc. The Domestic Engineering Co., which for a number of years has been manufacturing a  $\frac{3}{4}$ -kw. Delco light set for the farm market, has added a 3-kw. set for this field. Many of the characteristic features in the smaller outfit are incorporated in the bigger one.

The engine is a single cylinder upright one, with a cylinder bore of  $3\frac{3}{4}$  in. and a stroke of 6 in., and is rated at 5 hp. Its operating speed ranges from 1000 to 1200 r.p.m., depending on the load which the generator is carrying.

Both the inlet and the exhaust valves are located in the cylinder head, which is cast separate from the cylinders. The cylinder itself is cast with vertical cooling flanges, which are surrounded by a sheet metal draft tube. There are also cooling flanges on the head and these are covered by the draft tube top, in which there is a large central opening. The inlet valve is made of chrome nickel steel,

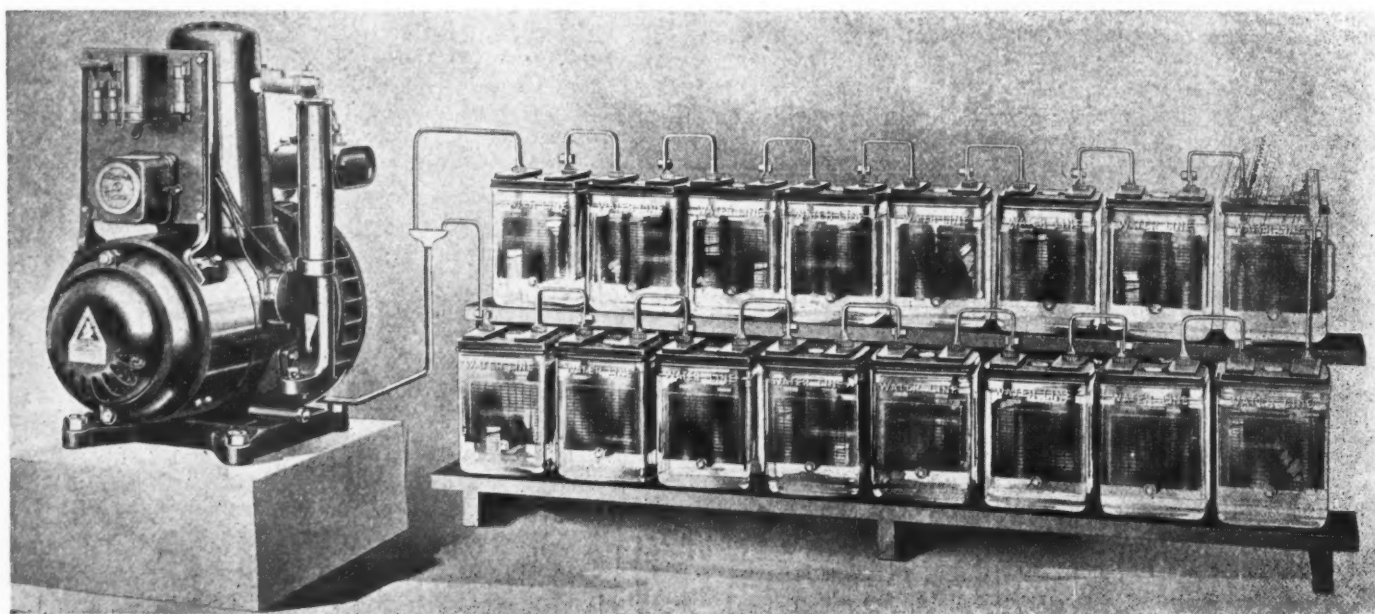
and has a clear diameter of  $1\frac{3}{4}$  in. The exhaust is made of tungsten steel and is of special design. Its stem is drilled out, a small amount of mercury introduced, and the stem then sealed.

In operation, the head of the exhaust valve becomes very hot, and the mercury begins to boil, the vapors rising from it ascending to the top of the valve stem. The upper part of the valve stem is cooler than the lower part, and as the vapors come in contact with it, they condense and the mercury returns to the bottom of the stem. In this way, the head of the exhaust valve is kept from overheating.

The rocker arms, which open and close the valves, are held in place by a fulcrum pin, which in turn is held in place by a turret clamp mounted on top of the cylinder head. Tappet rods extend up the side of the cylinder from the valve plungers to the rocker arms. That part of the rods contacting with the rocker arms is hardened.

## Aluminum Piston Employed

An aluminum piston is used, in which there is sufficient metal to insure rapid transfer of the heat from the head to the skirt. There are three compression rings on the piston, all above the piston pins. The latter is fastened in the piston boss by a set screw and has a bearing in the upper end of the connecting rod, which is bronze-bushed. The connecting rod is an I section drop forging,

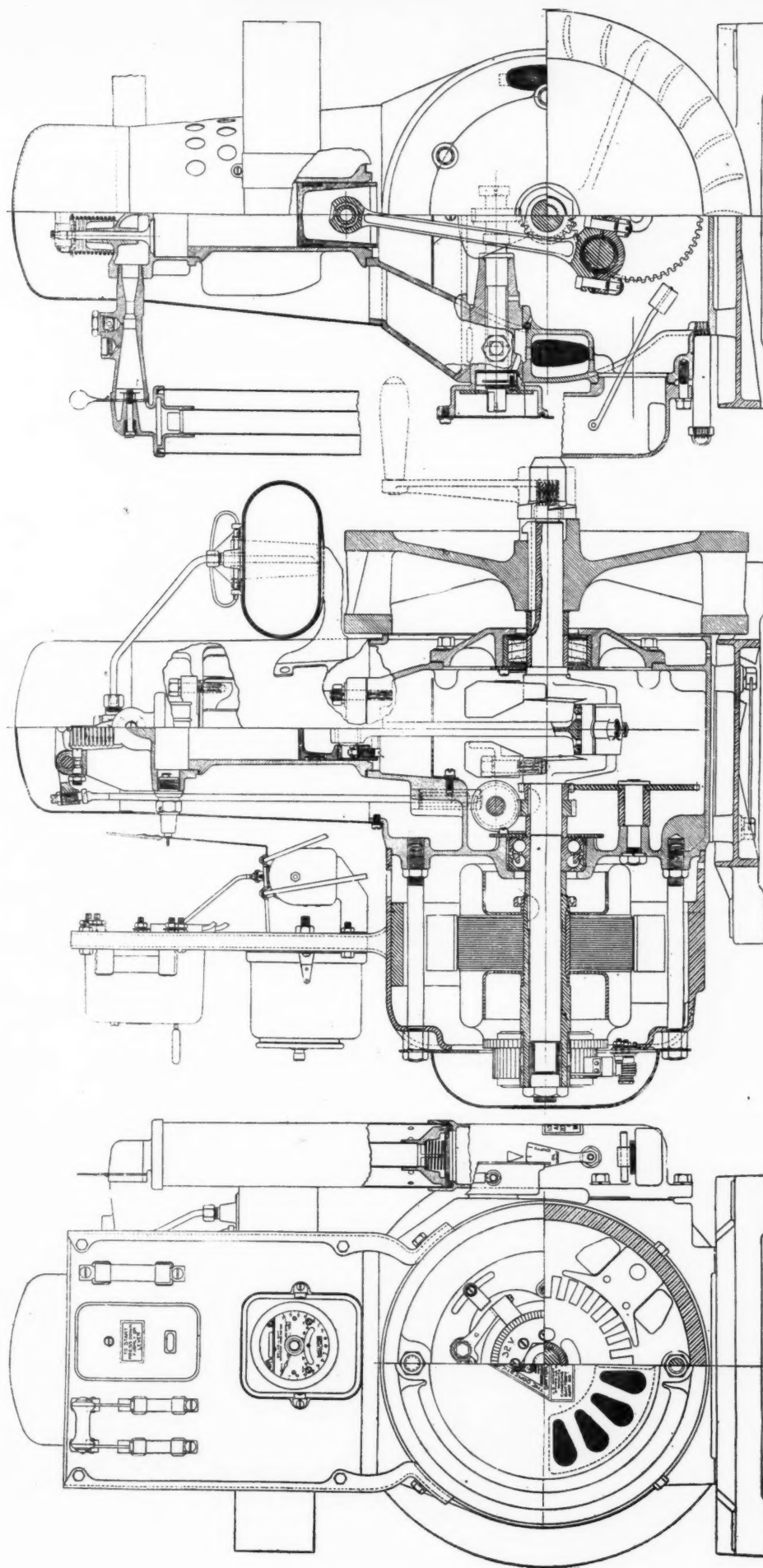


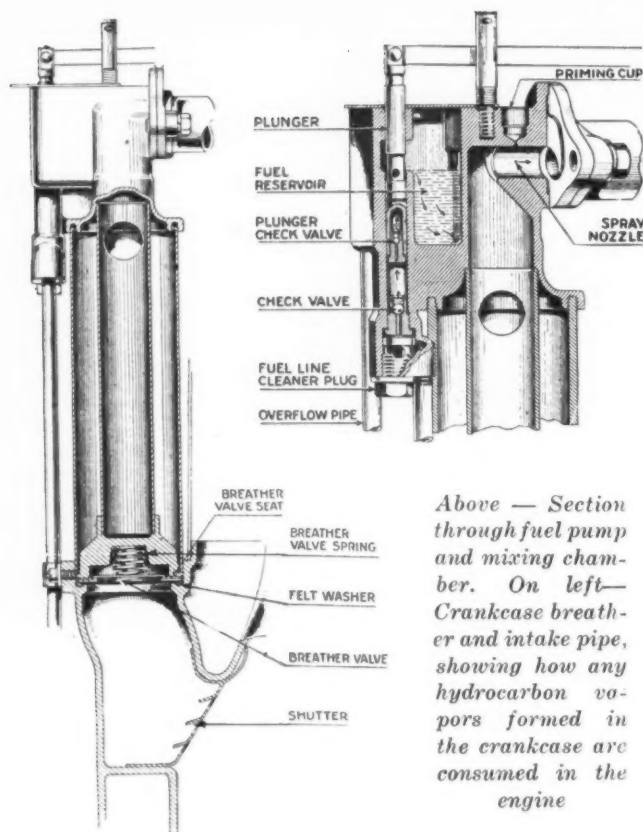
Delco 3-kw., 32-volt isolated plant



## 3-Kw. Delco Generator Set in Elevation and Section

*This plant burns either kerosene or gasoline, consumes any vapors formed in the crankcase, has an air cooling system and is self-regulating for voltage irrespective of load. The single-cylinder engine bore is 3 $\frac{3}{4}$  in. and stroke, 6 in.*





*Above — Section through fuel pump and mixing chamber. On left — Crankcase breather and intake pipe, showing how any hydrocarbon vapors formed in the crankcase are consumed in the engine*

with detachable cap, and its big end is provided with bronze-back, babbitt-lined half bushings.

The crankshaft also is a drop forging, and is supported in two anti-friction bearings, a Hyatt roller bearing at one end, and a New Departure ball bearing at the other. The shaft extends beyond its bearings at both ends, one end carrying the flywheel and the other end the generator armature. The ball bearing is placed at some distance from the crank and as close to the armature core as possible, so as to minimize the overhang of the armature. In order to reduce vibration, balance weights of the proper size are bolted to the two crank arms.

In addition to serving its regular office, the flywheel also performs a function in connection with the cooling of the cylinder. It is made in the form of a centrifugal fan, and draws air down over the cylinder head and the cylinders, then through air pockets in the crankcase, and finally discharges it at its periphery. The flywheel weighs approximately 130 lb.

#### Kerosene Used in Most Installations

In the majority of the installations, kerosene is used for fuel, and this is stored either in a 3-gal. tank, which may be placed close to the engine on the floor, or in a larger tank, which may be buried outside the building. As the fuel supply in either case is quite some distance below the mixing chamber, a fuel reservoir is cast on the cylinder head adjacent to the mixing chamber, to which the fuel is raised by a plunger pump which is operated from one of the valve rockers through a double-armed lever and link. The pump is of the hollow plunger type, with ball check valve in the lower end of the plunger. The excess of fuel pumped returns to the storage tank through an overflow pipe.

From the constant level fuel reservoir, the fuel passes through a small opening or spray nozzle into the throat of the mixing valve. The air necessary for combustion reaches the mixing valve through a breather tube, and its

flow can be regulated by means of an air valve at the top of this tube. The breather tube consists really of two concentric tubes. The inner tube at its lower end communicates with the crank chamber through a check valve, while the outer tube is provided at its lower end with a circle of small openings, through which air can be drawn in from the outside. At the upper end the outer tube communicates with the inner tube through a large hole in the wall of the latter.

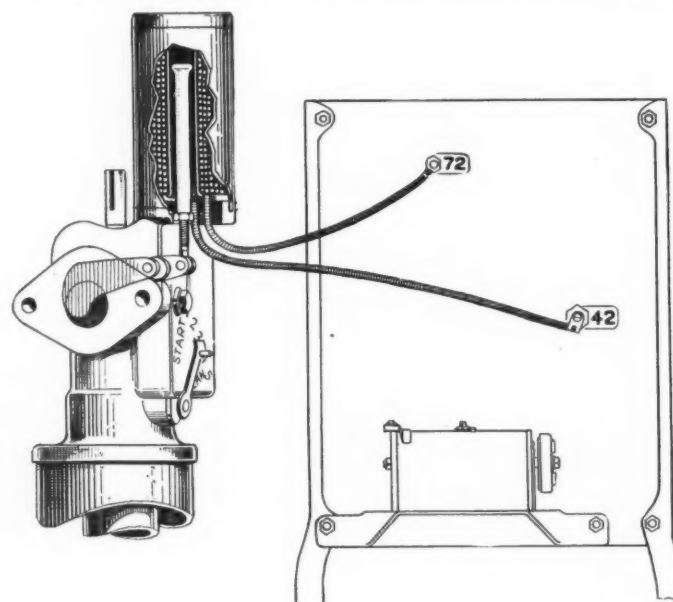
When the piston descends in the cylinder the air in the crank chamber is compressed, and some of it will be forced out through the breather valve into the intake breather, and will be drawn into the combustion chamber of the engine. On the following upstroke of the piston, the breather valve will close, and it is impossible for the air to return into the crankcase. In this way any combustible vapors that may form in the crank chamber will be drawn into the combustion chamber, where they will be burnt. The air in the room where the plant is installed will therefore not be vitiated by smoke from the crankcase.

#### Testing the Fuel Pump

No air can enter the crankcase through the breather valve, and all air entering the case must enter through the bearings on the crankshaft. As this air is sucked through the bearings, it will pull back any oil that may be working out along the shaft and in this way prevent the plant from throwing oil. At the opening in the crankcase over which the intake breather is secured there is a shutter which is designed to turn back into the crankcase all oil that is thrown against it when the engine is running.

To test the fuel pump, it is worked by the hand a few times, and if the level rises in the fuel reservoir, it shows that the pump is all right. In order to start an engine that normally burns kerosene, it has to be primed with gasoline. This is accomplished by means of a squirt can, a priming cup being provided for the purpose directly over the mixing chamber.

High-tension ignition is used. On the 32-volt system, current for ignition is taken from the entire 16 cells which constitute the storage battery. On the 110-volt system, current for ignition is taken from only 16 of the 56 cells. The timer is mounted on the end of the camshaft, outside the crankcase, the housing being provided with a lug for changing the timing of the ignition. Ignition current is stepped up by a plain coil, and the primary circuit is led through the starting switch, so that the act of closing the



*Voltage control by solenoid and throttle valve*



starting switch also closes the ignition circuit or throws on the spark. The ignition coil is mounted back of the switchboard, quite close to the spark plug, which is screwed into the cylinder head from the side. There is a special ignition switch on the front of the switchboard, and as long as this switch is open no current can flow through the ignition coil.

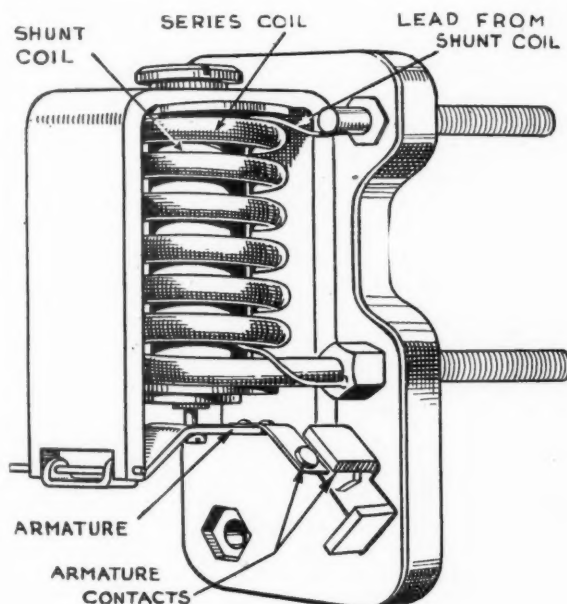
Lubrication is by a form of splash, but instead of the usual dipper or oil splasher on the connecting rod cap there is a spur gear in the bottom of the crankcase meshing with a pinion on the crankshaft alongside the cam gear helical pinion. This gear picks up the oil and distributes it over all interior parts. As the main bearings are anti-friction bearings, the problem of lubrication is comparatively simple.

### Engine Speeds

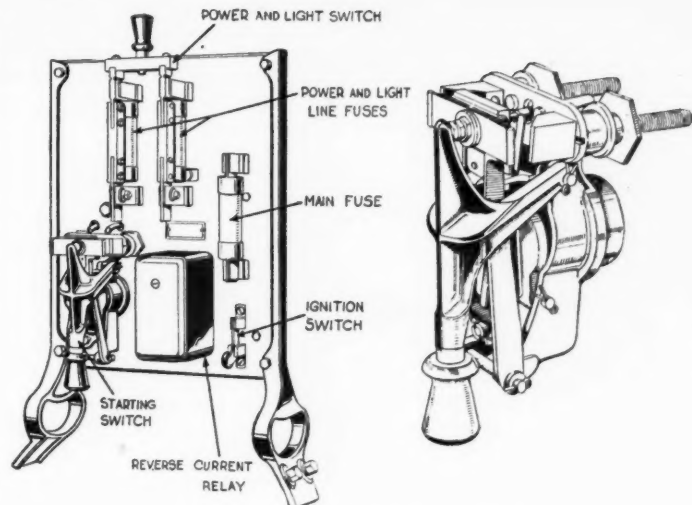
The engine runs at speeds between 1000 and 1200 r.p.m., the exact speed depending upon the load on the generator. In order to properly govern the speed an electromagnetic governor or voltage control is used, an illustration of which is shown herewith. It consists of a coil connected across the generator mains, in which there is a soft iron plunger directly connected to the throttle valve. This valve consists of a plate which fits over the opening from the mixing valve into the cylinder heads. When the engine is turning over at 1000 r.p.m., the generator will produce from 500 to 750 watts, whereas when it is turning at 1200 r.p.m., the generator produces 3000 watts.

When the engine is running at 1000 r.p.m. and the generator is carrying no load, the voltage at the generator terminals, in the case of a 32 volt system, will be approximately 38 volts, and the same voltage, of course, will be impressed upon the terminals of the voltage control coil. If the voltage at the generator terminals increases for any reason, the voltage control coil becomes stronger and draws the plunger up into it, which results in the throttle valve being partially closed.

When a load is thrown on the generator, its voltage will drop. This results in the voltage control coil losing some of its strength, and the plunger will drop to a lower level, thereby opening up the throttle valve. This causes the engine to speed up and to generate more current to take care of the increased load. When the full load of 3 kw. is on the generator, the voltage at the generator terminals is 32 volts on a 32-volt plant. When the voltage reaches this



Reverse current cutout



Switchboard and starting switch

point, which is the lowest possible, the magnetic pull on the plunger will be reduced, the plunger will sink in the coil, thereby opening the throttle valve wider, giving the engine more fuel and increasing the speed to 1200 r.p.m.

With this system of control, if the battery charge is very low and the engine is then started up, it will charge the battery for a short period at a very high rate, but the battery voltage will quickly pick up and then the charging rate will be reduced.

An instrument board is furnished with the set which carries a voltmeter and an ammeter and can be secured to the wall near the plant. The voltmeter indicates the state of charge of the battery and the ammeter the rate at which the battery is being charged or discharged.

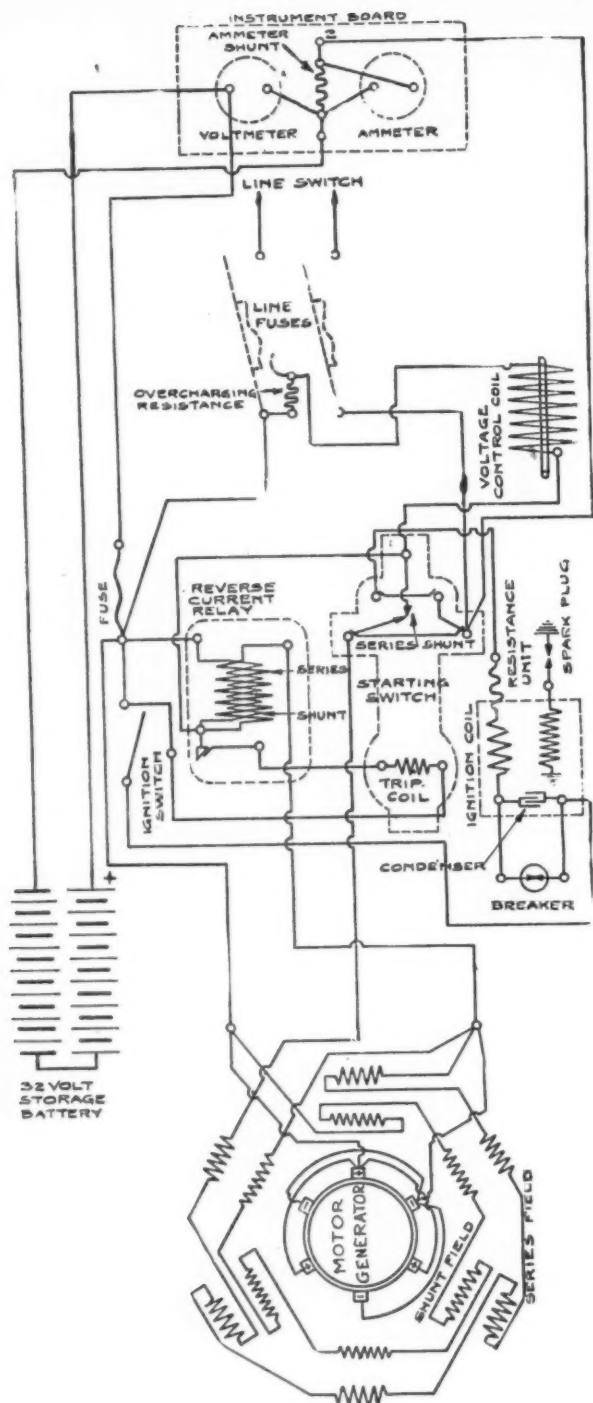
### Overcharging Resistance Unit

As long as the power and light switch on the switchboard is closed, the voltage of the generator should never exceed 38 in the case of a 32-volt plant. This means that a battery can never be charged beyond about 75 per cent of its capacity. If it is desired to give the battery an overcharge, as should be done occasionally, a small resistance unit, known as the overcharging resistance unit, on the back of the switchboard, is brought into play. When the power and light switch is opened this unit is automatically connected into the voltage control circuit. A higher voltage at the generator terminals will then be required to produce the same effect on the throttle valve. Therefore, the throttle valve will be opened farther, and the engine will run faster in order to produce this increased voltage. The manufacturers recommend that the battery be given an overcharge about once a month.

The 3-kw. generator is of the 6-pole type, with annular field frame, and is combined with the engine into a single unit. The generator housing or field frame is secured to the crankcase of the engine by two studs, one at the top and one at the bottom. The pole pieces are laminated, the laminations being riveted together by means of two thin and one heavy steel rivet, the heavy steel rivet serving for an anchorage for the bolts by means of which the pole piece is secured to the field frame. The armature with its commutator is built up on a sleeve, so that it can be removed from the crankshaft as a complete unit. It is driven by means of a Woodruff key.

The use of ball and roller bearings on the crankshaft makes it possible to reduce the air gap between the pole pieces and armature to 1/32 in., which results in a very efficient generator.

The brush plate assembly consists of a plate to which



Circuit diagram of Delco 3-kw. installation

the brushes are fastened. The brushes are of carbon composition, and are held in place by brush arms, these latter being mounted on studs and subjected to spring tension, so that the brushes bear on the commutator with the proper pressure.

There are two separate windings on the field poles, a shunt winding and a series winding. Both of these are energized while the generator is cranking the engine, whereas only the shunt winding is used in regular operation. The reason for the provision of the series field winding is that it reduces the amount of current which it is necessary to draw from the battery to produce a certain starting torque.

A switchboard for controlling the electric current is mounted on top of the generator. On it are mounted the starting switch in the lower left-hand corner, the re-

verse current relay in the center below, the ignition switch in the lower right-hand corner, the power and the light switch with fuses on the upper part, and the main fuse on the right-hand side. When the plant is started up by means of the starting switch, the power and light switch should always be open, but as soon as the engine has begun to develop power, the power and light switch should be closed.

To start the set, the handle of the starting switch on the switchboard is pulled up. This accomplishes three things, as follows:

1—The circuit is completed between the battery and generator.

2—The ignition contacts are closed so that a spark will occur at the spark plug.

3—The contacts are opened on the back of the board, throwing the series windings in the generator into action, giving it more power as a motor to turn the engine over until it is running under its own power.

After the generator has begun to produce current, the main contact of the starting switch remains closed, so that as soon as the engine is firing, it is not necessary to hold up the starting lever. The switch is held closed by a trip coil on the back of the switchboard, which coil is controlled in turn by the reverse current relay to be described presently.

When the starting switch is open, no current can flow from the battery to the generator, or vice versa, as the circuit between them is then open. When it is desired to start the plant, the starting switch handle is pulled upward. This movement brings the main switch contacts together, whereby the circuit between the storage battery and generator is closed. Current now starts to flow through the windings of the generator, and the armature begins to revolve.

#### Reverse Current Relay

The reverse current relay, mounted centrally on the lower part of the switchboard, forms really a part of the starting switch. Its function is to keep the main contacts together as long as the generator is producing current, and to allow them to open when the engine stops, thus breaking the connection between the battery and the generator. This reverse current relay works in conjunction with the trip coil of the starting switch. On the relay there are both a shunt winding and a series winding.

As soon as the generator starts generating, a current will begin to flow through the shunt winding of the relay, and slightly magnetize it. The magnetic force, however, is not sufficient to attract the armature to the core. When the generator voltage exceeds the battery voltage, current will flow from the generator into the battery, and this current has to pass through the series windings of the relay. Then the magnetic effects of both the shunt and series windings of the relay add together, and the armature of the relay will be pulled up to the closed position. This causes the current to pass through the trip coil on the starting switch, whereby the starting switch will be automatically held close.

If now for any reason the engine should stop, the charging current will immediately decrease in value, and possibly there may be a reverse current from the battery into the generator. This reverse current would demagnetize the relay, and cause the switch to open. As the relay opens the circuit through the trip coil is broken, and the starting switch opens, thereby interrupting the main circuit between storage battery and generator.

THE distribution of the Nobel prizes for 1919 for physics, chemistry, medicine and literature is to be postponed till June 1, 1920.



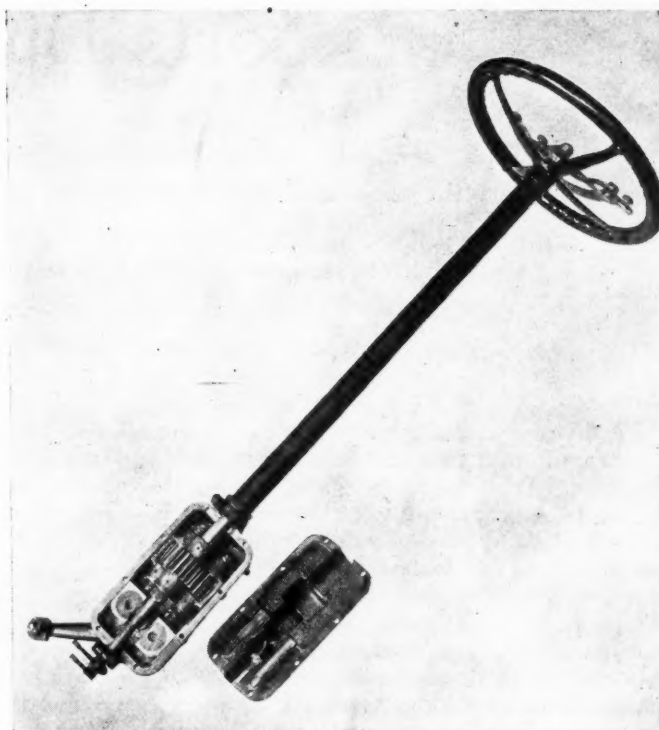
# Positive Adjustable Screw and Nut Steering Gear

A STEERING gear, in which adjustment can be made for any wear, has been designed and put in production by the Ohmer Fare Register Co. The housing of this gear is provided with a cover, and both parts are made of malleable iron. The steering post, or outer tube, is pressed on to a malleable nut, which is threaded into the upper end of the housing and locks therein.

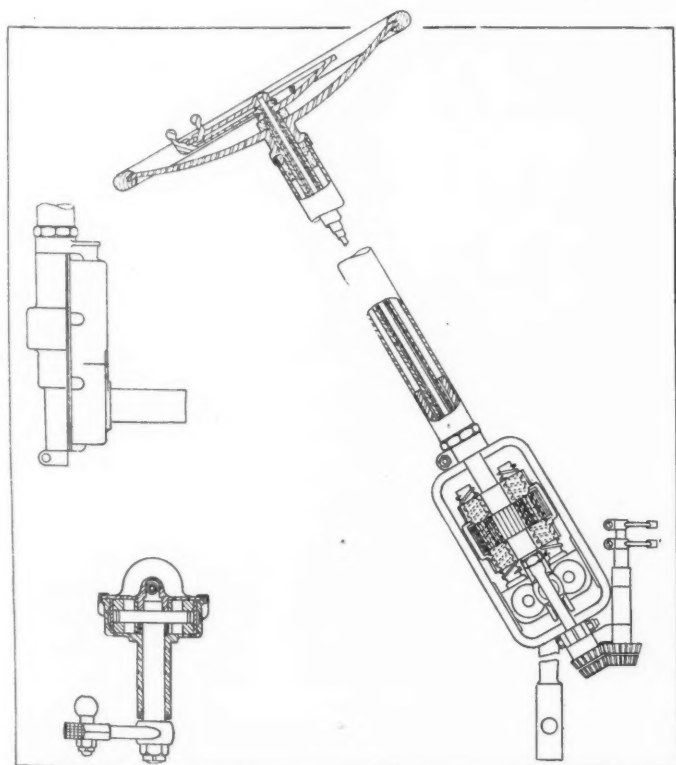
The rocker shaft has a bearing in the side of the housing, and in order to insure efficient lubrication, it is cut with six oil grooves extending its entire length. Within the housing there is a cast iron nut, having one right hand and left hand thread. The center portion of the nut is cut away to permit of the introduction of a set of three pinions. Two of these pinions are fitted to the screws, and have splines or keys cut out of the solid, the function of these pinions being to revolve the screws in the nut.

The nut is attached to the housing and located therein by a tongue on its base, fitted to a slot in the housing, and held in position by four bolts. It is backed up by a suitable screw, which is threaded through the upper end of the housing, and provides the means of taking up lost motion due to wear of various parts.

The screws, which are made from low carbon, open-hearth steel, are cut with double Acme thread, and they can be made to give any desired ratio or reduction from  $7\frac{1}{2}$  to 15. The former is just within the limit of reversibility, while the latter is entirely irreversible. The outer diameter and the two splines or keyways, which are cut longitudinally on the screws, fit in the broached holes in the splined gears, and these gears, running freely in the



*Steering gear with parts exposed*



*Sectional drawings of components of Ohmer gear*

nut and sliding freely over the screws, allow the screws to be rotated, and since the screws are oppositely threaded, they will move in opposite directions longitudinally. The screws engage the entire nut at all times, and thus have large bearing surfaces. As they make two complete revolutions in moving the steering arm from one extreme to the other, the splines provide a sure means of distributing oil entirely through the nut. The screws are hardened and ground on the ends which come in contact with the thrust blocks.

The thrust blocks are made from low-carboned steel, and hardened and ground on their bearing surfaces. The same applies to the swivel blocks, which are fitted into the thrust blocks, and in action have a slight oscillatory movement therein. These swivel blocks each have a rectangular hole which engages the opposite arm of the rocker shaft.

High-carbon nickel steel is the material used for the rocker shaft. The steering arm is secured to the rocker shaft by means of four splines of substantial cross section, with their sides parallel to each other and to the axis of the shaft. These splines fit corresponding slots or keyways in the boss or hub of the steering arm, and as the pressure on these splines is tangential there is no tendency toward distortion. The steering arm is made of high-carbon nickel steel, heat treated, and is provided with an inserted case-hardened ball. Special attention has been paid to the problem of lubrication. An oil bath is used, and it is claimed that the movement of the parts insures positive circulation of the oil.

This gear is manufactured in three models, as follows: Model 300-A, for passenger cars up to 3000 lb., and for  $\frac{3}{4}$  to  $1\frac{1}{2}$ -ton commercial vehicles; model 300-B for passenger cars of 3000 to 4000 lb. and 2 to 3-ton trucks, and model 300-C for use in commercial cars of 3 to 5-ton capacity.



# What Britain Lost in Passenger Car Exports During the War

There is much interest in Britain's position in the world's automotive trade. Before the war, she was a close rival of this country. The war's absorption of her mechanical facilities put her out of regular trade channels for that period. Just what she lost is shown in the figures presented here. They will be interesting when compared with the export gains of the United States for the same periods. To regain her old position, Britain must reverse the figures of the last five years.

IN five years Great Britain's car export trade has dwindled to a mere fraction of what it was prior to August, 1914, and she has not the satisfaction of being able to point to the maintenance of her domestic trade. It is true that intense activity prevailed throughout the war in the British automotive plants, but production was solely for military use, and nothing was available for regular trade either at home or abroad. Great Britain certainly did export a number of cars and chassis, but an analysis of their destination indicates that these were for the service of her far-flung armies and for those of her allies.

A case in point is that of Russia. In 1913 the value of British cars and chassis exported to that country was \$576,962. In 1917 the total was \$3,248,073, an amount but little below the grand total of exports to all countries in 1915. Obviously, this abnormal increase of over 460 per cent was a direct result of military needs. It is equally obvious that this artificial demand has ceased not only in Russia but in France (Britain's other big war customer), and that not only is this the case but it may be years before Great Britain is in a position to pick up the dropped threads of pre-war export, or, indeed, whether either of these former customers will be in shape to purchase.

It is noticeable that during 1915 Great Britain made an effort to maintain her trade with her colonies. Indications are, however, that this was mainly in the interests of military forces being recruited overseas, and that the cars and chassis were absorbed for war service. Trade with the colonies dropped off just as soon as Australasia, South Africa and India had their respective contributions to the forces of the Empire ready for service at one or other of the fronts.

Canada was at this period drawing her war-service cars from us.

During the period covered in the tables herewith the value of the pas-

senger cars exported by the United States more than doubled, while, as already shown, the falling off in Great Britain's exports is greater by far

Passenger Cars and Chassis Exported from the United Kingdom

Country of Destination	1913		1914		1915		1916		1917	
	No.	Value	No.	Value	No.	Value	No.	Value	No.	Value
<b>COMPLETE CARS</b>										
United States	76	\$290,043	64	\$201,176	33	\$115,784	74	\$389,982	31	\$180,761
Argentina	304	622,333	62	130,675	23	40,659	2	11,455	1	1,460
Belgium	154	194,908	199	215,245	..	..	..	..	..	..
Brazil	77	136,739	39	72,759	4	4,589	2	4,696	8	5,042
Denmark	146	149,348	125	155,986	142	149,951	110	339,833	27	68,369
France	419	426,685	110	186,364	410	928,762	456	1,044,107	113	187,900
Germany	109	138,608	35	62,335	..	..	..	..	..	..
Japan	69	128,991	15	37,560	4	4,939	17	36,635	1	4,287
Java	77	148,574	123	169,087	46	62,330	9	19,757	5	6,472
Russia	429	558,703	312	912,590	276	947,639	590	2,168,245	658	2,081,406
Spain	120	164,142	60	123,711	22	54,943	20	41,477	23	58,967
Other foreign countries	561	837,379	463	803,780	112	177,715	101	242,507	260	346,685
Total foreign countries	2,541	\$3,796,453	1,607	\$3,071,268	1,072	\$2,487,311	1,381	\$4,298,724	1,127	\$2,921,349
Australia	1,055	\$1,693,625	1,191	\$1,797,228	430	\$629,453	145	\$208,179	30	\$43,988
British India, via:										
Bombay	500	843,204	413	652,432	344	527,018	145	248,819	91	282,530
Madras	198	243,671	157	182,207	95	120,737	46	59,220	7	9,466
Bengal	434	618,167	472	640,495	244	311,076	119	163,938	19	34,080
Burma	91	140,311	79	110,260	35	43,964	30	46,869	7	11,198
Canada	169	445,338	94	265,375	7	28,834	10	38,898	3	5,596
Ceylon and dependencies	178	277,887	156	228,604	62	91,826	47	77,776	3	8,010
Federated Malay States	191	313,641	76	111,360	14	18,858	16	15,840	7	8,103
New Zealand	829	1,192,760	907	1,216,255	604	751,821	184	250,347	30	39,949
South Africa:										
Cape of Good Hope	557	839,427	321	463,135	117	153,309	47	50,597	12	16,157
Natal	115	155,032	100	158,468	28	33,973	13	17,617	6	8,769
Transvaal	262	404,795	149	249,812	46	64,277	59	65,800	8	9,324
Straits Settlements	285	423,799	165	236,823	39	51,215	54	76,506	55	69,590
Other British possessions	190	273,818	167	214,116	142	182,888	187	210,379	160	150,263
Total to British possessions	5,054	\$7,865,475	4,447	\$6,526,570	2,207	\$3,009,249	1,102	\$1,530,785	438	\$667,022
Total car exports	7,595	\$11,661,928	6,054	\$9,597,838	3,279	\$5,496,560	2,483	\$5,829,509	1,565	\$3,618,371
<b>CHASSIS</b>										
United States	7	\$21,213	65	\$250,187	53	\$202,651	36	\$146,365	5	\$13,870
Belgium	37	65,795	81	241,266	..	..	..	..	..	..
France	134	478,625	154	555,496	35	87,792	139	295,732	190	465,782
Germany	25	52,398	26	55,391	..	..	..	..	..	..
Russia	8	18,259	383	1,021,284	48	100,513	48	235,432	391	1,186,667
Other foreign countries	137	194,645	104	210,072	67	83,962	16	40,080	6	13,222
Total to foreign countries	348	\$830,935	813	\$2,333,696	203	\$474,918	239	\$717,609	592	\$1,679,541
Australia	617	\$852,387	413	\$506,589	112	\$171,169	126	\$204,471	15	\$20,843
British East Indies	109	220,963	89	168,234	51	80,628	152	319,919	35	89,777
Canada	65	182,912	13	38,869	..	..	..	..	..	..
New Zealand	67	130,821	82	119,687	79	92,235	37	50,164	6	17,704
Other British possessions	28	46,280	26	50,665	38	91,967	12	14,512	10	9,709
Total to British possessions	886	\$1,433,363	623	\$974,044	280	\$435,990	327	\$589,066	66	\$138,033
Total chassis exports	1,234	\$2,264,298	1,436	\$3,307,740	483	\$910,917	566	\$1,306,675	658	\$1,817,574
Total British car and chassis exports	8,829	\$13,926,226	7,490	\$12,905,578	2,690	\$3,920,166	3,049	\$7,136,184	2,223	\$5,433,945
Total United States passenger car exports	24,293	\$24,275,793	8,305	\$25,392,953	23,880	\$21,113,953	50,234	\$40,560,263	64,808	\$43,612,632

than is apparent from a cursory examination of the figures.

A proportion of our own car exports is directly traceable to war orders, but it should be remembered that we have been able to maintain our domestic trade throughout the period in a fairly satisfactory way, and, in addition, to find sufficient cars for export to Latin America, Scandinavia, and other countries untouched by war. We have made notable gains in the Orient, and our Australasian trade has been good despite limitations imposed by lack of shipping and a severe shortage of passenger cars.

Turning to imports, we find that Great Britain's figures show fluctuations. In 1915 the peak was reached, with our contribution 'way at the top. In that year British purchases from the United States were valued at \$17,026,249 out of a total import value of \$20,702,663, a striking instance of our wartime supremacy in the automotive field.

Great Britain's 1918 export and import figures have been compiled, but details as to the countries which supplied or purchased the cars and chassis are not yet available. The totals follow:

British Exports, 1918—Cars, 2,647; value, \$8,826,780; chassis, 65; value, \$188,606.

British Imports, 1918—Cars, 490; value, \$1,344,945; chassis, 2,915; value, \$9,500,210.

U. S. Car Exports to Great Britain, 1918—Cars and chassis, 892; value, \$1,929,672.

### Passenger Cars and Chassis Imported by the United Kingdom

Country of Origin.	1913		1914		1915		1916		1917	
	No.	Value	No.	Value	No.	Value	No.	Value	No.	Value
<b>COMPLETE CARS</b>										
United States.....	3,619	\$3,622,584	6,225	\$6,384,517	15,358	\$13,588,592	5,024	\$4,467,140	567	\$1,055,953
Belgium.....	418	1,185,956	277	876,447	.....	.....	.....	.....	.....	.....
France.....	1,351	2,026,848	642	992,333	615	782,523	17	21,009	56	22,342
Germany.....	253	442,671	122	205,546	.....	.....	.....	.....	.....	.....
Italy.....	138	283,878	232	551,204	131	221,119	11	12,745	.....	.....
Netherlands.....	5	10,074	5	7,285	1	1,460	.....	.....	.....	.....
Switzerland.....	15	37,949	.....	.....	5	17,057	.....	.....	.....	.....
Other foreign countries.....	9	11,071	3	4,867	3	2,555	.....	.....	1	1,280
Total from foreign countries.....	5,808	\$7,621,031	7,506	\$9,022,199	16,113	\$14,613,306	5,052	\$4,500,894	624	\$1,079,575
Canada.....	1,012	\$839,194	9	\$13,626	537	\$557,788	59	\$51,682	.....	.....
Other British possessions.....	.....	.....	5	8,614	5	7,421	1	608	1	1,217
Total from British possessions.....	1,012	839,194	14	22,240	542	565,209	57	52,290	1	1,217
Total car imports.....	6,820	\$8,460,225	7,520	\$9,044,439	16,655	\$15,178,515	5,109	\$4,553,184	625	\$1,080,792
<b>CHASSIS</b>										
United States.....	328	\$346,835	565	\$888,915	2,014	\$3,437,657	2,748	\$3,669,652	4,812	\$15,103,373
Belgium.....	748	1,310,850	443	741,767	.....	.....	.....	.....	.....	.....
France.....	5,601	5,584,683	4,405	4,407,166	1,261	1,366,469	37	32,494	1	2,920
Germany.....	415	661,834	271	442,005	.....	.....	.....	.....	.....	.....
Italy.....	675	1,023,036	890	1,433,379	449	598,808	187	215,966	84	184,387
Switzerland.....	116	202,982	34	57,279	10	36,255	6	18,162	.....	.....
Other foreign countries.....	58	78,623	40	63,440	2	3,212	.....	.....	.....	.....
Total from foreign countries.....	7,941	\$9,208,843	6,648	\$8,033,951	3,736	\$5,442,401	2,978	\$3,936,274	4,927	\$15,290,680
Total from British possessions.....	17	10,570	1	1,703	105	81,747	26	26,479	.....	.....
Total chassis imports.....	7,958	\$9,219,413	6,649	\$8,035,654	3,841	\$5,524,148	3,004	\$3,962,753	4,927	\$15,290,680
Total British car and chassis imports.....	14,778	\$17,679,638	14,169	\$17,080,093	20,496	\$20,702,663	8,113	\$8,515,937	5,652	\$16,371,472
Total United States passenger car imports.....	748	11,759,380	300	620,493	322	525,303	1,474	801,911	105	183,280

For some months it has been impossible for us to export cars to Great Britain, owing to the placing of an embargo on importation. The way has now been opened to a limited extent, however, and restrictions have been removed to the extent of permitting the importation of 5000 passenger

cars on a pro rata basis, taking the numbers imported from 1912 to 1915 for purposes of calculating the proportion to be allocated to each importer. This step has been taken to relieve the car famine at present existing in the British Isles. It may be a preliminary to complete freedom.

### Dugald Clerk on the Still Regenerative Engine

SINCE the announcement of the Still combined gasoline and steam engine in a paper read before the Society of Arts, pointed reference to it has been made in a paper before the North East Coast Institute of Engineers and Shipbuilders by Sir Dugald Clerk, F.R.S., the premier authority on internal combustion engineering in Great Britain. The ideal aimed at by Still has been considered by many earlier students of gas engine efficiency. Sir Dugald Clerk in his book (1886) on the gas engine refers to an engine operating on the Brayton cycle, which was introduced in England by a Nottingham firm, Messrs. Simon, and exhibited at the Royal Agricultural Show in 1878. In addition to the ordinary arrangement of the engine, they attempted to gain increased economy by utilizing the waste heat passing into the water jacket and the heat of the exhaust gases in raising steam. They would undoubtedly have increased the economy of the engine in this manner had they not turned the steam so raised into the motor cylinder along with the flame.

The matter is further referred to by Sir Dugald Clerk in his book, "The Gas, Petrol and Oil Engine," where he states that the brake thermal efficiency of a combined gas

and steam engine would be about 43 per cent. Regarding the Still engine, which is of the reciprocating type, in the most efficient form he reckons that its net efficiency is 37 per cent as compared with 36 per cent for the best Diesel efficiency as determined by Mathot. While still believing that there is some advantage for the regenerative combination of gas and steam engine, Clerk holds that it will be necessary to use a Parsons turbine to obtain it.

### Economics of the Airplane

SPEAKING on Progress of Aviation in the War Period before the Royal Aeronautical Society recently, Dr. Leonard Bairstow said that the speed of aeroplanes had increased from 85 miles per hour to 135 miles per hour in five years, and some further improvement might be expected in the future. No equal addition to the speed range was probable, and economy suggested a reduction. It was not possible to decide from a single estimate of the value of speed in civil aviation, but for fighting it was the last reserve of superiority, which was all important. In the commercial sphere, where time is money, the choice between speed and cost of running depended on how often a man's time was worth more than \$50 an hour, or some such figure, and whether the aeroplane could save any of that time for him.



# Visualizing the Management's Part in Business for Employees

Many amusing stories came from Russia, after the revolution, of employees taking over factories and dismissing the management and taking charge of the entire works. In a few weeks these factories were stopped and the employees were begging the managers to come back. This was due to a lack of understanding by the employees of the vital part management and capitalization have in the conduct of business. This week Mr. Tipper tells how one American company made this plain to its employees.

By Harry Tipper

THE story which we began last week of the promotion work of the American Multigraph Co. to its employees includes so many elements that it is impossible to give it completely in these articles. The talks on business organization, which were given by the president of the company to all employees, and descriptions of some of the visualized presentations about which we spoke, were printed in a booklet, a copy of which was given to each of the employees for further study.

This booklet includes a series of charts, which are shown herewith, and these charts are explained as a part of the booklet of industrial organization.

## IDEA IS NUCLEUS

First, I will put a circle on the blackboard. This will represent an idea around which the business is built. In this circle I will put the letter "I" to designate "Idea." Around this circle I will put another circle which may represent one or more individuals who believe they can commercialize the idea, and are known as the management. We represent this second circle by the letter "M" designating "Management." (See Chart No. 1.)

If the concern I am graphically charting proposes to manufacture and sell a commodity, and assuming that the management now consists of one individual, this individual must secure raw material out of which to produce a marketable article, so I will represent the source of raw material by a circle drawn below the managerial circle and connected to it by a straight line as illustrated in Chart No. 2. I will assume that the manufacturing facilities are contained within the managerial circle and the individual owner of this plant is able to furnish the necessary funds to purchase his raw material. He is also his own labor and converts raw material into a salable article, but the process at this stage is only half completed. He must dispose of his article and through it receive money or credit with which to secure more raw materials, pay his expenses and anything over being his profit. There must be a source of outlet for his product. In other words, he must turn his product into cash. We will represent this by a circle above the managerial circle and connected with it, this circle being known as "C" or "Customer," so that the chart now appears as in No. 3.

This chart would be complete in every respect providing the individual owner could continue to do his own manufacturing, selling and financing without assistance. However, assuming normal growth, the probabilities are that the first assistance the owner would call for would be financial. To carry the idea further I will assume that the owner now interests a friend in the enterprise who, through a partnership arrangement, invests his money in the business, but does not become active in it, and is known as a silent partner. To illustrate his con-

nection with the enterprise I show a circle to the right of Management designated as "F" or "Finance" and connected to Management by a straight line. I will now assume that through the additional finance the business grows and the owner is no longer able to do his own manufacturing, so he employs labor. We will represent "Labor" by a circle to the left of Management and connected to it by a straight line and known as "L," as shown in Chart No. 5.

We now have the four parties necessary to a manufacturing industry surrounding the fifth party or Management. At the top the "Customer" or source of sales and income. At the right "Finance" or source of capital. At the bottom "Raw Material" or the source of purchases. At the left "Labor" or the source of effort. It is quite apparent that the proper coordination of these four factors is absolutely essential to any successful business. This is one of the main functions of management in industry.

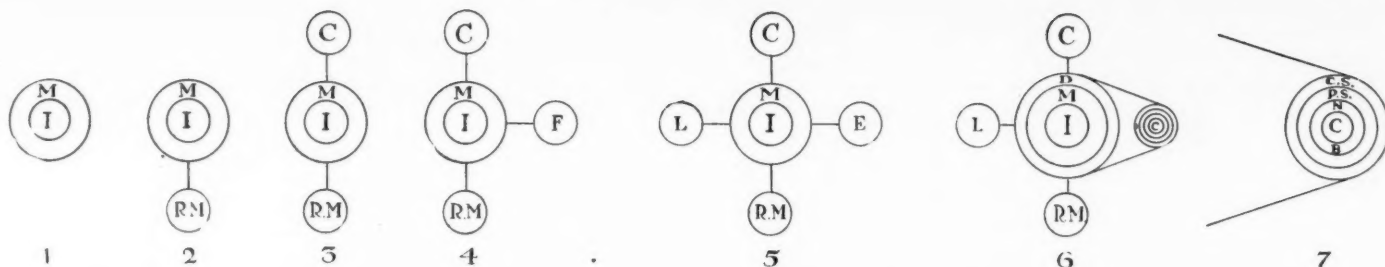
On the present form of the chart we represent a partnership. Assuming that the business continues to grow, and requires more finances, it is necessary to secure a number of silent partners to furnish further working capital. These individuals form what is known as a corporation which must be chartered under one of the States of the Union, setting forth in its articles of incorporation its purpose and field of activities. They issue shares of stock in the corporation which represent fractional ownership in its assets and also right to earnings in the form of dividends. The original owner of this business I will say, as is usually the case, accepts the corporation's stock for the value of his plant and good-will.

## Management Is Centered

It is readily seen that it is not only impractical but undesirable that all of the individual stockholders should supervise the management and pass upon the policies and other activities which are continually arising. They therefore elect from their midst a predetermined number of directors who serve for one year and whose function is to conduct the company's affairs through its authorized management. As a rule the majority of these directors are not actively engaged in the business, so they elect from their number a President, Vice-President, Secretary and Treasurer to represent them actively in the management of the company's affairs.

In the next chart, or No. 6, we will show a circle around the management which represents the "Board of Directors," with connecting line to the source of capital or stockholders, showing from whom the directors receive their authority. This in the rough shows the simplest form of corporate existence; the letter "D" will represent the "Board of Directors" and the letter "C" in the circle representing source of "Capital" or stockholders. To more clearly describe the source of Capital we will show a separate chart, No. 7, starting with a small circle, letter "C" to represent "Credit." This may be either bank credit or purchase credit. This means the bank





will loan the concern money on its note and the raw material dealer will extend time for the purchase of raw material. The next fundamental source of capital comes from the note and bond holders who lend their money to the corporation usually secured by mortgage on the property. This circle will be designated by "N" and "B" for "Notes" and "Bonds."

In the next largest circle we represent Preferred Stockholders, who receive a preferential stock certificate which entitles them to a preferred lien on the assets of the business. They also receive preference as to dividends, usually a fixed rate, before the Common Stockholders participate in the earnings. We will represent this circle by "PS" standing for "Preferred Stockholders."

In the next circle we will show the "Common Stockholder," whose title to the assets and dividends of the corporation comes after the preferred security holders are satisfied, both as to principal and dividends.

The line running from the circle representing "Common Stockholders" to the "Directors" represents the source from which the Directors receive their authority, and to whom the security holders look in the matter of safeguarding their investment and assuring their dividends and interest. In the case of dissolution or outright sale of all of the assets of a corporation the workers, through the Mechanics' Lien, have the first call on the funds realized to satisfy wages. Next come the Creditors, next the Note and Bond Holders and next the Preferred Stockholders, all of these claims receiving preference in their respective order. The Common Stockholders re-

ceive the balance, if any, this balance being divided proportionately among the owners of common stock according to the number of shares owned. Voting power is usually given to the Common Stockholders so that the Directors, as a rule, are elected by vote of Common Stockholders. However, there is a clause in most preferred issues which gives voting power to the Preferred Stockholders in the event a certain number of dividends have not been paid them, or, further, that the tangible assets back of their security have been dissipated.

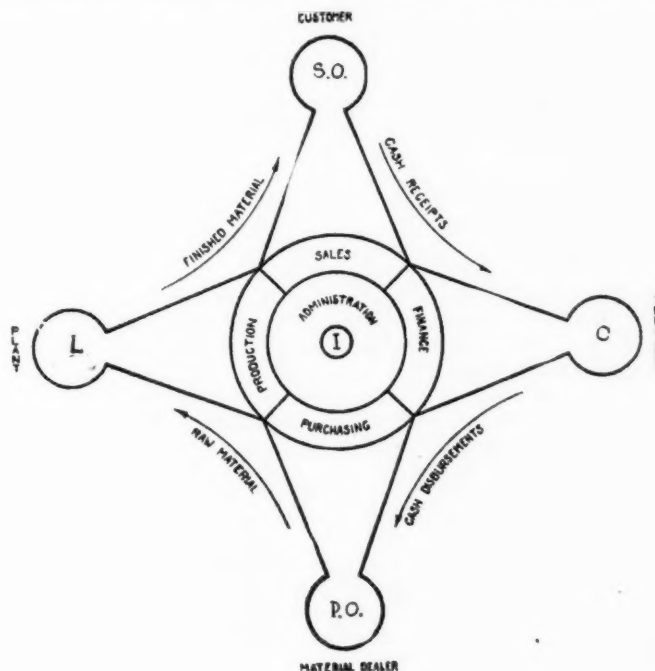
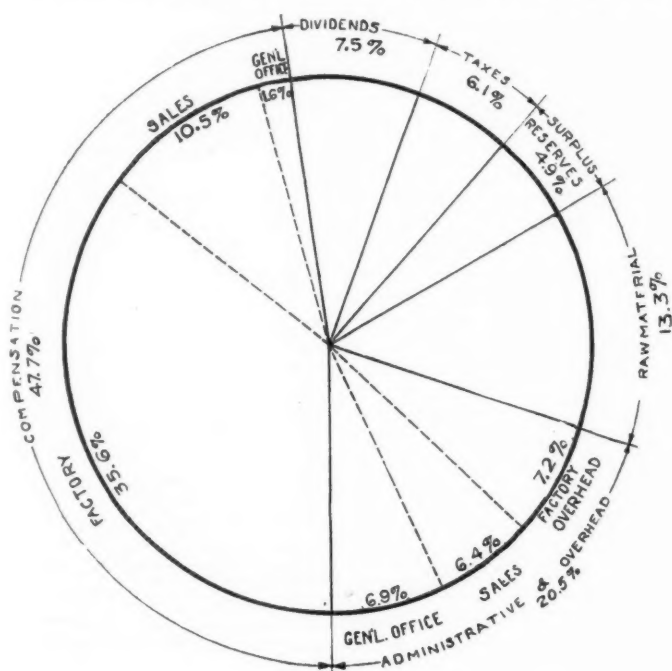
Before going further with the chart I should like to inquire as to how many of the audience have been the owners of Liberty Bonds or had money at interest in the form of savings deposits or other securities. (Practically unanimous.) I see that most of you have been owners of securities and I must use care in the handling of this subject, as I realize I am talking to an audience of capitalists.

And now to return to Chart No. 6 I can illustrate some of the remarks I made earlier this evening in reference to capital and labor. You can readily see that Labor, Raw Material Dealer and Capital must look through Management to Customer for their return, as this is the only source of income a corporation can have. Capital will furnish the necessary funds for Labor and Raw Material in the early stages of a business and also during the times of adversity, but after a concern once reaches a point that its income exceeds its outgo the Management is expected to satisfy the demands of Labor, Capital and Material Dealers through the sale of the product it manufactures.

## Visualizing the Financial Problem

In order to show the employees the legal obligations which were assumed by the company when it became a corporation and issued stock and bonds, the company brought to the plant one of the state officials concerned with these matters to lecture to the employees and ex-

plain the law in regard to stock and bonds and other obligations. These matters, as well as the matters of interest and insurance, were thoroughly visualized to the employees in each lecture so that they could apprehend not only the reasons for their existence but the necessity for



their existence in the organization and the fact that the organization would not continue without them.

In the second booklet, which contains a summary of the second series of talks, there are also a number of charts, the first one indicating the various percentages of the gross income absorbed by the different departments, the second one indicating the contact between the general organization, the customer, the material dealer, treasury, and the factory, and the third one amplifying the second and showing the object of the constitutional plan in this organization. The explanations of this final chart, as gotten out by the company, are given here, and it will be noted that this explanation shows the position and the reason for the constitutional plan and the way in which this plan connects up the labor with the general management, just as capital is connected up with the general management through the directors and executives.

### FROM MATERIAL TO MONEY

At the top corner of the square we have a circle representing the customer who exchanges his money for our product and is known as our Source of Sale and Income.

At the bottom corner of the square we have a circle representing the material dealer with whom we exchange our money for his product and is known as our Source of Purchases.

At the left corner of the square we have a circle representing all mental and physical effort connected with our industry. These efforts are exchange for cash in the form of salary, bonuses, wages, profit-sharing or commissions. This circle is known as our Source of Labor.

At the right corner of the square we have a circle representing the investors in our enterprise. These furnish us capital in exchange for the title to all of our assets and rights to dividends or interest on their investment and is known as our Source of Capital.

It is readily seen that the four corners of the square representing Sources of Sales and Income, Capital, Purchases and Labor are co-related and indispensable to one another. To illustrate: If our sales were cut off we would lose our Source of Income with which to satisfy the other three sources and also our outlet through which to dispose of the raw material which labor has converted into marketable wealth. With our capital withdrawn we would not be able to finance our raw material or labor. With our labor eliminated we would not be able to convert raw material into salable products and without raw material we would have nothing for labor to convert.

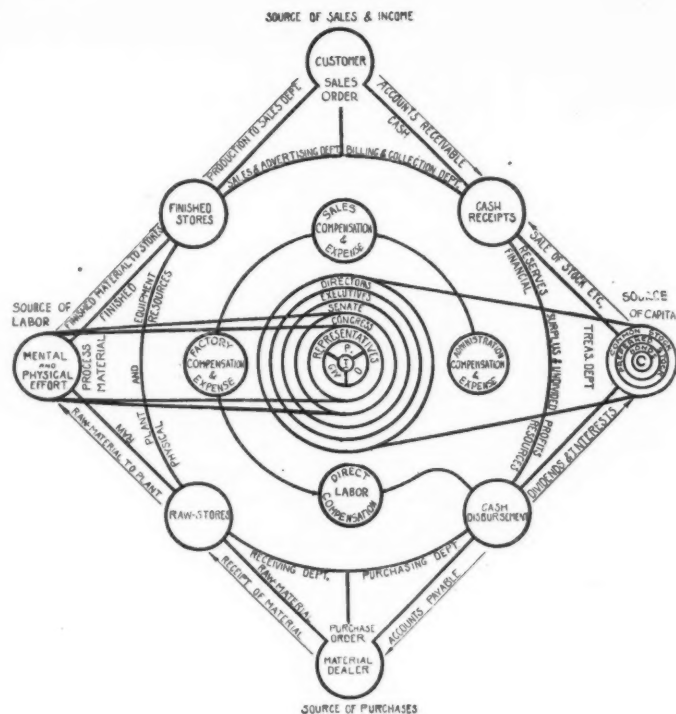
To insure all four corners of our square functioning properly, and that each receives a square deal, we must have some central body which we know as Management and which we illustrate in the center of our chart by a series of circles. The form of management in force in our organization is built on the principle of industrial democracy, and working from the center out, we first have a small circle representing the idea around which all of our activities revolve (Manufacturing and sale of labor-saving office devices).

### Importance of Patents

In the second circle are the three all important, intangible assets: Patents, Organization and Good Will; Patents to protect the idea, while Organization and Good Will are being built; Organization to handle the activities of every branch of the industry; and Good Will of the public toward our product, the personnel of our organization and the service we render our customers.

A patent is a grant by a Government to an inventor of a design, process or device, giving exclusive rights within its domain to manufacture, use and sell the idea patented for a limited term of years from the date of its issue, and is evidenced by a document setting forth a description of the invention, and one or more claims of novelty of a patent depend upon the degree of protection it affords the inventor from competition in the conversion of the invention into wealth and the number of years such protection is still in force.

Good Will consists of a favorable public opinion. Its worth depends upon the ease with which product or service is disposed of to the customer.



Conversion of raw material into marketable wealth

It is impossible to theorize as to the proper division of this circle, but interesting to see how the areas of these sections change with the age and growth of an enterprise. To illustrate: In our own case when the American Multigraph Company was organized the patent section covered practically the entire area of the circle; while the organization section, consisting of Mr. Gammeter the inventor, and myself, occupied a very small area, with no good will in evidence. At this stage the security for invested capital in our enterprise was based on intangible assets consisting of an idea surrounded by patents and a small organization with abundance of faith in the idea. As the organization grew and the devices approached a marketable stage, the organization and patent sections changed in relation to their importance as intangible assets. The good will section came into existence as soon as the devices were put upon the market and grew through the efforts of the Advertising, Sales and Service departments, decreasing the relative size and importance of the Patent section. It is readily seen that as the Patent section decreased, due to expiration and abandonment, Organization and Good Will must be built up so as to fill the gap and eventually occupy the entire circle when all patent protection is gone. Also as Good Will increased, Organization may be cut down without loss of volume. To illustrate: If Good Will were developed to a point where customers would mail us their orders accompanied by cash payment, the Advertising, Branch Sale, Billing and Collection departments would be useless, and while that condition is not dreamed of in the sale of office appliances the more nearly we approach it through the building up of Good Will, just so much can we cut down on that part of organization which pertains to the disposition of our product.

### Labor's Part

In the next or third circle we have the departmental labor representatives elected for one year by popular vote, whose duty it is to represent their respective departments before the labor congress, which occupies the next or fourth circle. This body consists of twenty-four employees, ranking below departmental manager, twelve of whom are elected for one year by popular vote from employees who have been in the service one year or more, irrespective of departmental limitations; and twelve appointed by the president in consultation with the three elected Congressmen receiving the greatest number of popular votes. Congress selects from its number a chairman, who appoints all congressional committees and presides at all regular monthly or special meetings.



Congress receives and passes on all suggestions and complaints from the employees through their departmental representatives, on matters pertaining to employment or discharge, working conditions, compensation, hours of labor, etc., and originates measures to correct injustices, bettering conditions, etc., based on the square deal to all four corners of the charted square and the managerial centers, and passes on such measures to the Senate for their approval.

The Senate, which occupies the next or fifth circle, is not elective but made up of all departmental managers with the Vice-President of the Company who appoints all Committees and presides over all monthly and special meetings as Chairman. The Senate's function is to pass on measures adopted by Congress and if disapproved they are returned to Congress with suggested changes. If approved, they are sent to the Executive Committee occupying the next or sixth circle.

This body is composed of officers of the Company elected by the Board of Directors. The President presides over the Executive Committee and the Secretary of the Company acts as its secretary. Its function is to pass on measures approved by the Senate. If disapproved they are returned to the Senate with suggested changes. If adopted they are passed on to the Board of Directors for final approval, or, if the measure requires the approval of the stockholders, such action is taken at the next regular or special stockholders' meeting.

### Work of Congress

Certain classes of measures may receive final approval from Congress; other classes of measures require the final approval of the Senate, and others final approval of the Executive Committee, etc., depending upon their relative importance effecting the rights of all parties concerned.

Most of the work of Congress and Senate is acting on the recommendations of their Committees, which meet as often as occasion requires.

The Industrial Relations Manager acts as Secretary of the Congress and Senate and their respective Committees, and the proceedings of all such meetings are kept as a matter of record.

It will be seen through this plan of managerial organization, capital and labor may get their ideas, complaints or suggestions heard and given consideration by working through their representative without fear or favor.

The lines connecting Congress and Representatives with Labor, as well as Directors with Stockholders, shows how our Sources of Capital and Labor are represented in the management of the business.

In the left hand section, directly below the circle, known as Customers, we have the Sales and Advertising Departments. In the right hand section we have the Billing and Collection Departments. Between the two we have the Sales Order. The Sales and Advertising Department are the originators of the sale; the Sales Order is the evidence of the sale and the Billing and Collection Departments consummate the sale.

In the right hand section directly above the circle known as Source of Purchases we have the Purchasing Department. In the left hand section the Receiving Department and between the two the Purchase Order. The Purchasing Department is the originator of the Purchase. The Purchase Order is the evidence of the purchase and the result passing through the Receiving Department consummates the purchase.

These bottom sections show the conversion of cash into raw material through the material dealer, and the top sections show the conversion of branch inventory into cash through the customer. The section to the left of the circle representing the Source of Capital includes the reserve, surplus and undivided profits and represents the Treasury Department.

The similar section to the right of the circle, representing Labor, includes raw, processed and finished material and represents Plant and Equipment. A vertical line drawn through material dealer and customer, dividing the chart in half, would show all financial resources and activities at the right side of this line and all physical resources and industrial activities at the left.

The circle on the straight line between the circle repre-

senting the Source of Sales and Income and Source of Capital is known as Cash Receipts. Cash Receipts come from investors in payment for the securities of the Company and from the customer in payment for the Company's product. (There are other sources of income, such as interest on securities owned, etc., which are not shown on this chart.) From there it goes to the Treasury Department. A similar circle on the straight line between the circle representing the Source of Capital and the Source of Purchase represents Cash Disbursement, which receives its funds from the Treasury Department, which are disbursed, first, to satisfy labor in the form of salaries or wages; second, to satisfy expenses represented by the three circles known as Administrative, Sales and Factory; third, to satisfy material dealers in the settlement of accounts payable; fourth, to satisfy the Company's security holders in the form of dividends and interest.

The circle on the straight line between the circles representing Source of Material and Source of Labor is known as Raw Stores, and receives its supplies from the Material Dealer through the Receiving Department and disburses it to the plant for fabrication and then passes through in the form of raw, processed and finished material and enters the circle on the straight line between the circles representing the Source of Sales and Income and Source of Labor, known as Finished Stores. From this point it passes through Branch Inventory to the Customer.

For fear of complicating the chart, a number of departments of our business were intentionally not shown, but the activities of any department may be located by following the course of cash into raw material, through the plant into Finished Stores, through Branch Inventory to the Customer and back into cash.

### Reasons for Chart

It is my desire that, through the study of this chart, first, the relationship of all parties concerned may be better understood; second, that it may convince you that the income of capital and labor must come from consumers of our products; third, that the financial activities of a corporation are equally important with the manufacturing and sales activities; fourth, that to secure a well-balanced, smooth-running management both capital and labor must be represented; fifth, that both labor and material must be paid for within so many days regardless of the time necessary to convert the product into cash through the consumer; sixth, that the interests of capital and labor are identical and therefore should not be antagonistic; and last, and most important, if the chart will but start men thinking right on financial and industrial relations, I shall be happy and well repaid for the work of creating it.

In closing, I wish to again reiterate that at times Capital has considered its complete function to be the making of profits, rather than the service to society at a profit; and Labor has made the mistake of thinking that its sole object was to secure the highest wages with the shortest hours of work, without consideration of the public, or the effect on rising prices. You will therefore see that for Capital and Labor to best serve society at large, they must work in total harmony and co-operation to the end that all parties to industry, which includes the consuming public, may be best served.

THE aeroplane record with passenger from Turin to Rome was broken on July 12 by Lieut. Brack-Papa, flying a Fiat B R biplane equipped with a Fiat 700 horsepower twelve-cylinder engine. The distance of 362 miles was covered in 2 hr. 15 min., which represents an average speed of 161 miles an hour. The previous record with passenger over the same route was 2 hr. 50 min., and was established by Sergeant Stoppani on a Sia machine.—*The Engineer*.

THE Italian Minister of Agriculture has appointed a commission which will make an investigation as to whether or not radioactive substances exist in Italy in sufficient quantities to be of practical use.



# Five Means of Direct Selling in China

China is improving as a motor car market and many students of the future assert that it is the biggest prospect of any nation. It is universally admitted that selling in China is more of an individual problem than any other nation. So we present this bit of experience.

**T**HE employment of a special representative, unattached except for his association with the exporter in the United States, has been found the best method of direct selling in the Orient.

Five methods by which manufacturers may maintain contact with foreign consumers in the Orient were outlined by F. R. Stites, Treasurer of the Federal Shipbuilding Co. at the recent Foreign Trade Convention, as follows: (1) The establishment of organizations by manufacturers themselves; (2) the establishment of small staffs of representatives to act as points of contact between manufacturers and local importing commission houses; (3) the attachment of the representative of the exporter to the importing commission house; (4) the employment of a single representative for a group of manufacturers of allied products, and (5) the establishment of manufacturers' agents directly, either as individuals or as commission houses in the foreign field.

Plan one, by which manufacturers have their own organizations in the Far East for importing, merchandising and distributing products is the one adopted by firms which manufacture one article exclusively, or by a small group of manufacturers of closely allied products, generally a class of goods which the masses of people use constantly, such as oil, tobacco and sewing machines.

## Organizations Employ Large Staffs

Such organizations usually have large staffs, including Chinese employees, and penetrate inland and arrange for delivery of cargoes, inspect stocks of local dealers, investigate credits of wholesale agents, make collections, recommend selling prices to meet competition and advise as to methods of advertising. In some of the larger ports the exporters establish their own retail stores. In the smaller ports they place the agencies with established dealers. Commodities have been introduced profitably in this way.

By plan two, manufacturers place their own small staffs in China for the convenience of the local importing commission houses. These representatives give out the latest market quotations as received by cable, enter orders for shipment on the basis of c.i.f. China ports and sell to various commission houses, who in turn are the actual importers and who in turn sell to large native dealers.

Under plan three, manufacturers have representatives in the field attached directly to a commission house. These representatives are usually paid in part by the commission houses and in part by the manufacturer. He maintains continued interest in the manufacturers' products, gives sales or engineering advice, and keeps his principals informed as to prevailing market conditions. This plan has the disadvantage at times of hampering movements of the representative, who finds that there would be greater chances of success if he had an opportunity of dealing through other commission houses or sometimes independently.

Under plan four groups of manufacturers of allied products send a special representative to the Orient. This was the plan followed by certain British steel interests prior to the war. It is reported that the progress of the plan was hindered by the war and also by the failure of the manufacturers to maintain a loyal sustained effort.

Plan five has been most successfully utilized. Some of these agencies carry only a few lines and conscientiously and intensely develop the markets for these. Others, however, add additional agencies without limit, with disappointing results. Success has attended the honest effort of these commission houses, but it behooves the export manufacturer to become acquainted with the character and activities of any firm he proposes to use as an agent.

The employment of the manufacturers' own representative has proved the most successful plan. His arrival in one of the principal cities of China is a signal for native dealers to come with inquiries or to make purchases, as the representative can "quote" prices, talk intelligently of deliveries and consider a reasonable counter offer. Furthermore, the personal representative can keep in touch with his factory by telegraph, advise regarding local conditions, and take advantage of the unexpected and sudden changes that sometimes accrue as a result of "exchange." For instance, the local market for an automobile one week might bring 2,000 taels and exchange would have made this equivalent to \$2,000 in gold, but the silver tael is a highly fluctuating medium, as compared with gold, and a week later the 2,000 taels may be equivalent to \$2,500 gold. Profits obtained in this way frequently more than pay the cost of maintaining the foreign office.

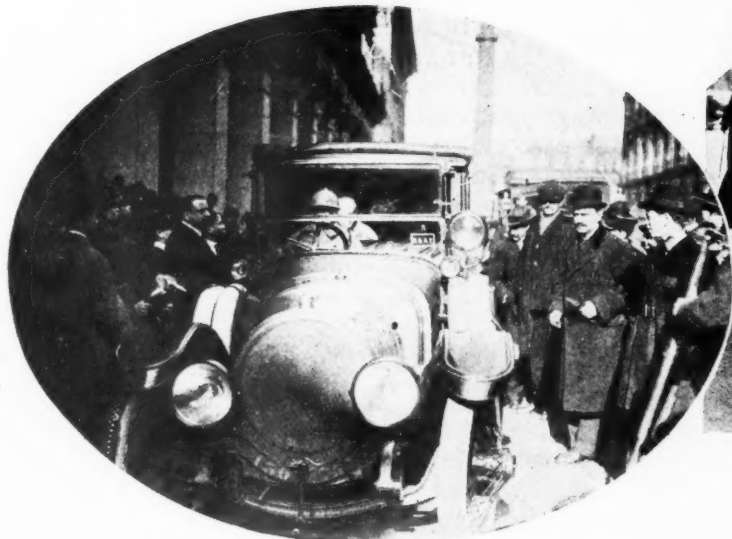
## Considerations of "Exchange"

The important consideration as to "exchange" in the Orient is that orders should not be accepted for shipments based on prices in silver. Silver fluctuations are so wide that exporters often find themselves heavy losers.

The employment of Documentary Letters of Credit with drafts at 60 or 90 days should be made by American exporters, who heretofore have been able to demand rigid conditions and "Confirmed Credits," but who now must compete with exporters who use the Documentary Letter of Credit plan. As a rule, the local bankers are a guide as to credit risks. It is in this matter of credits that a special representative is particularly valuable. Being on the ground, he is most capable of judging the character and worth of the importer and can supply detailed information about the capital invested, character and personal impressions.

He is also on the ground to combat the tricks of the trade, explain delayed deliveries guarantees, which are frequently made, and assist in the financing of big deals, such as sales to the government or to large corporations. In addition, he learns the advertising field, the peculiar demands of each local market, maintains friendly relations with purchasers and acts as an adviser on advertising.

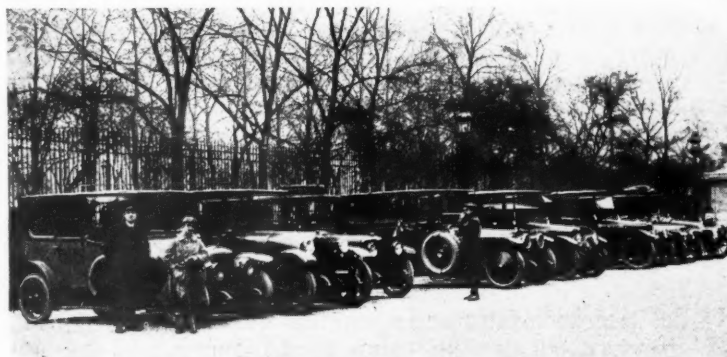
## Motor Cars Prominent in the Peace Conference



*Queen Marie of Rumania made this car familiar to many sections of the city*



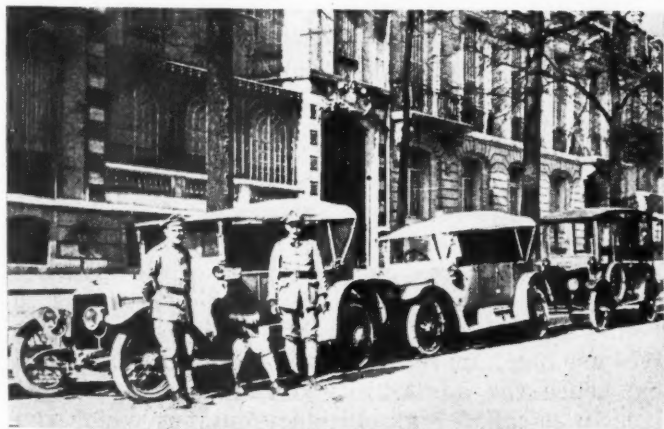
*A Cadillac and chauffeur attached to the U. S. peace delegation*



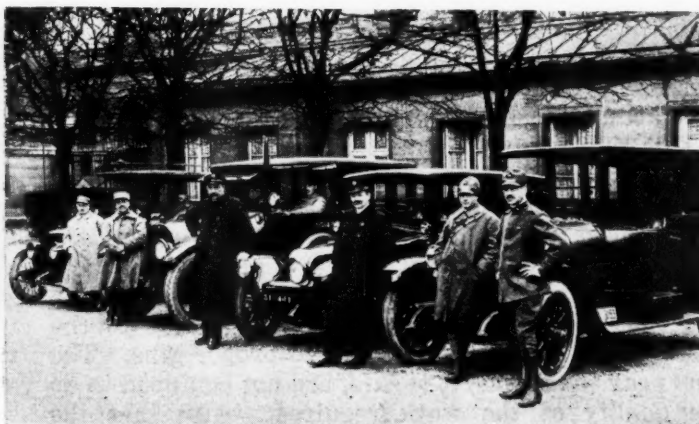
*American, French, British and Italian cars awaiting the adjournment of a session of foreign ministers*



*One of the cars assigned to the Czecho-Slovak delegation, perhaps with a view of encouraging emigration to U. S.*



*Czecho-Slovak chauffeurs and their cars*



*Renault, Panhard, Cadillac and Fiat cars waiting for peace delegates*



# AUTOMOTIVE INDUSTRIES

*The* AUTOMOBILE

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## The Middleman Profit

THE North Carolina cotton mills use chiefly cotton grown in that state or in Georgia and South Carolina. The natural inference would be that these mills obtain their supplies of the staple cheaply because of their nearness to the point of origin. But a recent report of the U. S. Department of Agriculture shows that these mills paid for their cotton supplies an average of \$11.50 a bale more than the farmer of that territory received for his product. The freight averaged about 30 cents a hundred, or \$1.50 a bale.

This indicates a profit of \$10 a bale, and at first glance it would appear that this was the scalping of the middleman. But that is not entirely the case. This report, while not showing exactly where the \$10 did go, does show that the growers and ginneries of the producing section are not doing their part entirely and that some of this middle cost was due to the necessity of sending this cotton to proper gins. The gins near the farms, it is said, are not equipped to do the quality of the work required. Also that the farmers of that section do not grow the kind of staple

desired by the mills. The mill men are not fitted to do conditioning and they have asked that gins capable of doing this work be established.

The getting together of the manufacturers and the producers is a vital link in reducing the cost of living. The elimination of unnecessary freight, profits and other expensive items between the two are points that must be considered. In this case, the unnecessary expenditure of \$10 per bale of cotton is not only the concern of the cotton grower and spinner, but in the end it is the interest of every employer who must pay a wage that enables his help to buy cotton cloth.

In the case of the North Carolina cotton mills this \$10 a bale amounted to \$15,000,000 in the year for which the records were made. This expense, of course, was spread to the consumers and added to the payrolls of the factories employing these consumers.

## Multiple Valves

SINCE the vogue of the high speed engine set in it has become rather common to fit engines with double valves, that is, two inlet and two exhaust valves per cylinder. The advantages are that, as compared with single valve engines, it is possible to secure greater relative valve capacity, and hence greater volumetric efficiency; that the mechanical stress in the valves need not be so great, as much lighter springs can be used, and that it is much easier to effectively cool the valves.

In addition to engines having duplicate valves of both kinds, engines have also been built occasionally in which only one set of valves was duplicated. In some cases this has been the inlet and in others the exhaust valves. This seeming inconsistency undoubtedly has been a puzzle to some students of engine design and may have suggested the thought that designers were not sure whether the inlet or the exhaust valves needed the greater capacity.

The explanation of the discrepancy lies in the different uses to which the engines are put. If it is desired to produce an engine of exceedingly high speed, such as has come to be recognized as advantageous for automobile work, then, if the cylinder size or other conditions do not seem to warrant duplicating both sets of valves, it should by all means be the inlet valves which are duplicated.

On the other hand, if the conditions of service limit the rotative speed of the engine, as in aircraft work, then the duplicate valves are needed more for the exhaust. In aircraft engines, where silence is not a factor, high valve capacity can be obtained by using a relatively high lift, and the most difficult problem is apt to be in connection with keeping the exhaust valves cool. Poppet valves have to dispose of their heat almost entirely to the valve seat, and the greater the diameter of the valve, the more heat it absorbs per unit of seat area, and the further the heat absorbed by the central portion of the valve has to travel. Experience, moreover, proves that large valves are much more difficult to keep cool than small ones, hence the advisability of using dual exhaust valves in so-called high efficiency engines which run constantly under nearly full load.



## Aviation Bills Before Congress

THE importance of the service rendered in the recent war by the aircraft appears to predominate in the minds of those who have presented to Congress bills looking to the future of air science development and, consequently, the industrial development. Three bills are pending in Congress, and each of these bears a strong military flavor. One is frankly a military bill, as it is the army idea put into the Regular Army Bill submitted to Congress by Secretary Baker. The other two are sponsored by Senator Harry C. New and Congressman Curry.

Last week AUTOMOTIVE INDUSTRIES printed in full the report of the American Aviation Mission which investigated aviation affairs abroad under Assistant Secretary of War Crowell. An editorial in that issue pointed out some of the good points regarding suggestions in that report and raised certain questions that are suggested by the reading of the report. Whether the idea expressed in this report will reach the form of a congressional bill remains to be seen, but legislative interest now centers on the three bills pending.

AUTOMOTIVE INDUSTRIES holds no brief for or against any bill because of its source, but this publication wishes to see the development of the idea that will promise the most for aviation. It sees a great future for the industry and its hope is that some official action will be taken to promote that development. It is with the idea of making the interested public familiar with the steps so far taken that space was given last week to the suggestions of the Crowell mission. This week we present a review of the three bills pending.

It undoubtedly is true that the important factor in aviation for the next few years will be of a commercial character and the New and Curry bills tend more toward the establishment of a Department of Aeronautics of a military flavor. They apparently aim to insure present rank to certain officers and greater authority to them after their transfer. The Curry bill, which would place the manufacture, design, production and general aircraft factory supervision under an Engineering Division composed of Army officers, is particularly tinged with the military idea.

Similarly Senator New's bill, although it mentions civil aeronautics, contents itself with brief discussion of this subject and devotes many pages to the future ranks of Army officers transferred to the proposed department.

These two bills are the only ones attempting, at this time, to co-ordinate aeronautics. They include such excellent features as provision for federal control of pilots, federal formulation of laws and regulations, federal aid for construction of flying fields, and so forth, but at the same time they put military aeronautics foremost and discount the importance of civil aviation.

It would seem that some sort of bill having more consideration for civil aeronautics would be more logical and popular. The bills introduced have not secured the sanction of either the Administration, the public, the industry, or the American Aviation Mission. It is said the New bill might pass the Senate on a party vote.

Some bill providing for development of commercial aeronautics through the extension of assistance to the aircraft industry, by means of new bureaus under a Department of Aeronautics, charged with the duty of developing civil aviation, and working in conjunction with the civil aeronautic bodies of Europe, might be more acceptable. It would certainly be more logical.

It is in commercial aviation that the defense of this country and the prosperity of the industry are to be found. Military aviation alone can neither afford the proper defense of the country nor grant to industry the development that it should be given.

## Same Week for 1920 Car and Truck Shows

New York and Chicago Exhibitions Will Be Separated Only in Location

NEW YORK, Aug. 18—The 1920 passenger car and truck shows, held simultaneously, but in widely separated buildings, will constitute the annual winter's exhibitions for both New York and Chicago. This radical departure from the plans of last year were announced to-day by officers of the National Automobile Chamber of Commerce, the organization that will supervise again the showings after a lapse of two years.

### Date Schedule

The exhibitions will be held under the following schedules:

New York, Jan. 3 to 10. Passenger cars and accessories at the Grand Central Palace. Commercial cars and accessories at the Eighth Coast Artillery Armory.

Chicago, Jan. 24 to 31. Passenger cars and accessories at the Coliseum and First Regiment Armory. Commercial cars and accessories at the International Amphitheater.

These dates and places, as well as the plans for management of the show and for the showing itself, constitute a wide variation from those of last year. Then, both shows were held under the direction of the dealers' associations of the two cities and the exhibition of commercial cars came the week after that of the passenger cars, although in the same building. This winter, the two shows will be under the management of the national association and the passenger car and truck divisions will be separated only as regards place, not time.

This was decided upon so that visiting dealers might kill two birds with one stone, not causing them to remain in the city from one week to another to view both showings. As many did not stay over the week-end last year, thus missing the truck showing, it was thought this plan would make the showing more national in scope, with a much increased dealer attendance for both divisions.

### Car Show Returns to Palace

The New York show last year was held at Madison Square Garden and in the Sixty-ninth Regiment Armory. This winter it will return to the Grand Central Palace, for the passenger car division, the same as two years ago. Four floors will be taken.

The truck division will exhibit itself, at the same time, in the Eighth Coast Artillery Regiment Armory, a large and well arranged building at 193d Street and Jerome Avenue, far uptown. This, however, was not considered an undesirable location by the show officials as it is only about thirty minutes by subway from the Grand Central Station, and was, indeed, almost the only place available for those dates. The building was declared by officials to be the largest of

its kind in the world without interior posts. The main hall is 300 x 600 ft., with a lower room nearly half as large, in addition to large company rooms, a gymnasium and spacious mess hall. The latter will probably be used as a restaurant.

The passenger car show at Chicago will not change in location from that of last year, it also having been held then at the Coliseum.

The truck division will go to the stockyards district and take over the building, consisting of an arena and two wings, used for the annual stock and horse shows and similar events. Plans call for the utilization of about 120,000 sq. ft. of space. It may be reached by elevated, being, probably, twenty to twenty-five minutes from the center of the city.

Diagrams and application blanks are in preparation by the Chamber of Commerce and will be ready for mailing on Sept. 8. The first allotment of space will be made on Oct. 2. As in former years when the association directed the shows, S. A. Miles will act as manager.

## Foreign and American Cars to Be Exhibited at Salon

NEW YORK, Aug. 16—Seven foreign makes of cars, as well as American models and accessories, are named in a list of exhibits just made public for the Annual Automobile Salon to be held here at the Hotel Commodore the week of Nov. 16-23. The entire second floor of the hotel will be utilized.

The European lines to be shown are announced as the De Dion Bouton, the Peugeot and the Renault, by French makers; the Rolls-Royce, the Sideley-Armstrong and the Sunbeam, by English factories, and the Lancia and, possibly, the Fiat by Italian makers.

American exhibitors, so far announced, are the Brewster, Cunningham, Daniels, Locomobile, Meteor, Phianna and Porter lines. Body builders to exhibit are the Ostruk, Fleetwood, Holbrook and Rubay companies. Several accessory makers also will show.

The officers of the show are E. Lascaris, De Dion Bouton representative here, president; T. E. Adams, Lancia representative, vice-president; Leon Rubay, of the Rubay Co., Cleveland, vice-president, and R. W. Schuett, Rolls-Royce representative, secretary and treasurer.

### APPROVE MANUFACTURE OF NEW OVERLAND SIX

TOLEDO, OHIO, Aug. 15.—Stockholders of the Willys-Overland Co., meeting here, have ratified the proposed new contract with the Willys Corp., the company just organized to include all the holdings of John N. Willys. Ratification of the contract assures production of the proposed six-cylinder car in factories outside of the one here. Announcement concerning the place of manufacture has not been made.

## Name Joint Body To Study Gas Problem

Motor and Producer Associations Merged in New Committee

NEW YORK, Aug. 18—An attempt to foster closer relations between the producers of oil and gas and the automobile industry will be made through committees representing the two interests, the appointments of which were announced here to-day. They will represent the American Petroleum Institute, on the one hand, and the National Automobile Chamber of Commerce, the Society of Automotive Engineers and the Motor and Accessory Manufacturers' Association for the automobile interests.

The first meeting of the combined committee will be held here on Aug. 21, when a specific program of work and efforts will be arranged. In general, however, the members will endeavor to co-ordinate the two industries, seeking the solution of various problems affecting the two industries and endeavoring to secure a dependable supply of gasoline to meet the growing demands of the motor car.

The automobile interests will be represented by John N. Willys, of the Willys Overland Co.; Alvin D. McCauley, of the Packard Motor Car Co., Detroit, and Charles W. Nash, of the Nash Motors Co., Kenosha, Wis., for the National Automobile Chamber of Commerce; F. C. Mack, of the Stromberg Motor Devices Co., Chicago, for the Motor and Accessory Manufacturers' Association, and Charles F. Kettering, of the Dayton Engineering Laboratories Co., of Dayton, for the Society of Automotive Engineers.

The petroleum institute has named Henry L. Doherty, of Henry L. Doherty & Co., New York; Samuel Messer, of the James B. Berry's Sons Co., Oil City, Pa.; Dr. William M. Burton, Standard Oil Co., of Indiana, Chicago; W. H. Isom, Sinclair Oil and Refining Co., and R. D. Leonard, Atlantic Refining Co., Philadelphia.

### ROCHESTER TAKES ONE MODEL

NEW YORK, Aug. 19—Further details of the transfer of manufacturing and sales rights from the Duesenberg Motors Corp. to the Rochester Motors Co., of Rochester, N. Y., of part of the Duesenberg products were made public here to-day. The Rochester company obtains rights merely for the Model G four-cylinder motor, manufacture of which was held up by war work. This is a 4 x 6 motor, developing about 75 hp. The Rochester company will manufacture and sell it under license from the Duesenberg company.

### RELIANCE PLANT CONVERTED

LANSING, Mich., Aug. 18—The Reliance Engineering Co.'s main plant, recently purchased by the Olds Motor Works, is to be converted into a department for finishing closed bodies. The plant will be equipped with wooden block floors mounted on a cement base.



## French Makers May Kill Grand Prix Race

### Opposition Manufacturers Vote Against 1920 Contest—Interest in American Participation

PARIS, July 31 (*Special Correspondence*)—Some of the leading French manufacturers are doing their best to kill the 1920 Grand Prix race. A meeting has just been held of the *Chambre Syndicale des Constructeurs*, which corresponds to the Automobile Board of Trade, when a unanimous vote was taken against racing in 1920.

It was not a difficult matter to engineer such a vote. Under the most favorable circumstances there must be a greater number of makers who will not race than those who have decided to build speed creations. All that was necessary, therefore, was to get together a meeting from which the racing enthusiasts were excluded in order to obtain an apparently unanimous vote of the French trade against racing.

#### Louis Renault Leads Opposition

The leader of the racing opposition is Louis Renault, the most important motor manufacturer in France, who has not taken part in any speed contest since he won the Grand Prix of 1906. The idea of the big manufacturer is that racing only tends to bring the small makers to the front, to the detriment of the old established firms.

Immediately after the armistice it was attempted to kill all the racing effort in France when the Manufacturers' Association decided that none of its members should take part in any sort of competition or speed contest. Ballot defied the official body and proved the absurdity of their contention that there was not time to build racing cars by producing his machines in about 100 days.

The Sporting Commission of the Automobile Club of France, which has sole charge of racing in France, has not yet decided what it will do. At the present moment it is making an inquiry among manufacturers with the view to ascertaining their ideas. If sufficient support is given the race will be held. There is no doubt that the rules will be 3-liter cylinder capacity and that a race will be run somewhere in Alsace.

#### Decision to Be Made Soon

As it only requires the support of five or six French manufacturers, together with a few foreign firms, to assure the success of the race, there is still quite a possibility that it will be held.

News received here to the effect that American makers will take part in a French Grand Prix under 3-liter rules has attracted considerable interest in sporting circles and aroused mixed feelings among opponents of racing. Indianapolis appears to have adopted 3 liters under the false impression that this was already decided on for the French Grand Prix. This assumption is

incorrect, for it is not even certain that a French Grand Prix will be held next year.

American victory in a French race would be a rather bitter pill to swallow, but if that victory were obtained under French rules and conditions, with which France has had years of experience and America practically none, the result would be almost disastrous. On this account there is a growing feeling that France ought to prepare a really strong field in order to meet the twelve American cars and drivers which are reported to be almost certain starters in the 1920 Grand Prix—that is to say, if there is a 1920 Grand Prix.

The Sporting Commission states that it will hold its race if reasonable support is promised. Probably in two or three weeks the fight will have been decided.

## American Manufacturers Have Space at Paris Show

PARIS, July 28 (*Special Correspondence*)—Fifteen American manufacturers have already secured space in the Paris show to open in the Grand Palais Oct. 9. These are: Buick, Cadillac, Ajax, Harley Davidson, Hupp, Indian, Maxwell, Mitchell, G. M. C., Dodge, Willys-Overland, Chevrolet, Oakland, Olds, and Scripps-Booth.

In addition to these firms ten accessories and tire makers have secured space in the Paris show. They are: Boyce, Motometer, Gaston Williams, Goodrich and Goodyear tires, Hoyt Metal Co., Oilday, Bowser, Klaxon, and Vacuum Oil. Entries are not yet fully closed.

## New Strike Brief At Overland Plant

TOLEDO, Aug. 19—A determined effort on the part of strikers of the Willys-Overland Co. to cripple plant production, now nearing normal figures again, was made yesterday. All workers in the plant were asked to stay away from work, cards bearing this appeal having been circulated the preceding week. The effort was a failure, however, as only 300 of the 9000 employees did not appear.

The department hardest hit was the machine shop. The strike was called by the machinists' union and practically every machinist in the establishment went out. While this department is now in operation, its force is still limited and the company found it necessary to job out a large part of the machine work to independent companies in Toledo and vicinity. The union is now making efforts to get machinists in these independent shops to refuse work on Overland material, and as a result the unions in a number of the plants called out their men last week.

In spite of this condition the Overland company is maintaining a production average of between 250 and 300 cars daily.

## France Will Purchase All Supplies of A.E.F.

Value Estimated at \$1,000,000,000 and Number at 100,000—  
No Official Figures Yet

PARIS, July 31 (*Special Correspondence*)—France has agreed to purchase the whole of the left-over supplies of the American Expeditionary Forces, this including about 60,000 cars and trucks and 20,000 motorcycles and sidecars.

Negotiations have been in hand for some time. The American Government offered the whole of its material to the French and refused to consider treating for parts only. It was desired by the French to purchase only such material as was specially required in France, this comprising railroad rolling stock, food supplies, tractors, buildings, etc.

The automobiles owned by the A. E. F. were not desired. It was made clear, however, that the American Government would not consent to separate the material. Owing to this a settlement was not possible earlier.

Value Estimated at \$1,000,000,000

The general estimate of the value of the American material secured by France is \$1,000,000,000. This, however, is only a guess. No official figures have been issued, and no information on the value of the material has been given out. The agreement has yet to be ratified by the French Parliament, and when this is done it is understood that announcement will be made regarding the actual price paid for these A. E. F. supplies.

It has been generally reported in all newspapers here that the automotive vehicles numbered 100 to 110,000. This is incorrect; even including bicycles and trainers, the number only reaches 100,000. A very accurate estimate of the number of American vehicles is 60,000, of which 45,000 are trucks and the rest touring cars. All of these are now being collected in five parts: at Clichy, near Paris; Romorantin, Verneuil, Le Mans, and Bourges.

It has not yet been decided how they will be disposed of. In all probability they will be mixed with French material now being sold by auction in various parts of the country. These sales, which up to the present time have only included automobiles and trucks from the French army, have already realized an income of more than \$20,000,000.

It is not at all certain, however, that they will all be offered for sale in France. There is a demand for automobiles in many other European countries, such as Roumania, Poland, Belgium, Czechoslovakia, etc., and the French will doubtless take advantage of this to dispose of some of its stock.

#### ELGIN ENTRIES

CHICAGO, Aug. 18—Tom Alley and Tommy Milton have signed up for the Elgin classic Aug. 23. Alley will drive a Bender special, and Milton a Roamer.



## British Seek Fuel Remedy in Benzol

### New Association Seeks Development of Home Product— Discuss Alcohol

LONDON, July 28 (*Special Correspondence*)—The movement to develop more national British fuel than gasoline seems likely being prosecuted with greater vigor since the promotion of the National Benzol Association, Inc.

E. Shrapnell Smith, formerly editor of the *Commercial Motor* and latterly a government official concerned with gasoline distribution, is acting as advisory specialist to the association and has been appointed its delegate on a new advisory committee which has been set up jointly by the Association and the Motor Fuel Joint Committee, with the triple objects of advising and suggesting, popularizing the use of benzol, and watching the development of home produced motor spirit.

#### Facilities for Benzol Production

Confidence is felt for this association and, through it, the new committee will do more for the cause of a much needed alternative fuel than the half score or more of government commissions which have followed each other in quick succession these last few years, with but little result.

Since the date when the chairman of one of the big petroleum groups told his company's critics, who were protesting against the high price of gasoline, that "the value of a commodity was what it would fetch," the counter movement for an alternative fuel has gained strength. This has been much increased by the war-time setting up of benzol recovery plants. These are now free to produce benzol for commercial purposes and must do so to keep them properly employed.

#### Criticism of Benzol

At the moment, however, there is much criticism of benzol affairs by motorists on such grounds as:

Too close a price relationship to gasoline—the critics urge that benzol should be at least 25 per cent cheaper than the commoner grade of gasoline.

Lack of delivery to customers.

Inferior or irregular quality, this last fault being the most notable and far-reaching in its ill effects.

Strictly speaking a 95 per cent pure benzol is not injurious to steel or iron fuel tanks or engine interiors, but that there is scope for these complaints shows that the standard of quality is much below the limit necessary.

As a number of motorists are taking advantage of the recent government concession to store up to 50 gallons of benzol without restrictions in drums, it is obvious that the question of the purity of the spirit is all the more important.

The government recently issued a report on the possibilities of alcohol for

motor fuel, but it does not reveal any new feature in the situation. It repeats very much what Doctor Ormandy and others have been declaring for several years. This is that alcohol alone is unsuited for engines with the present rate of compression, that the much believed-in possibilities of distilling alcohol from vegetable refuse found within the British Isles are a delusion and that the best hopes regarding alcohol center in its admixture with 50 per cent (some say 60 per cent) of benzol.

The most that can be hoped from alcohol as a commercial rival to gasoline is that it can be produced within the British commonwealth (but not at home) and probably cheapest from molasses and sugar-beet. Apparently, it can never be a British "grown" fuel, at least in effective quality, because it requires much more prolonged high temperature than is available in the British Isles.

## Ford Foreign Plants in Production Soon

NEW YORK, Aug. 19—Production soon will be under way at the assembling plants under construction by the Ford Motor Co. at Copenhagen, Denmark, and Cadiz, Spain.

Information received by the export department of the Ford company here today was that W. S. Knudsen, of the Detroit factory, had arrived at Cadiz and, with the assembling machinery already on hand, would commence actual construction at once. Two months was given as the time to elapse before assembling will start. Production of about 25 cars daily will be the program. The construction work on the Copenhagen plant already has commenced and should be completed within a month.

Ford export business was said to be continuing its climb, with increasing sales and good prospects for the fall months.

#### ATTACHMENT FOR FORDS

DETROIT, Aug. 18—The Knight Metal Products Co. is marketing an attachment to Ford cars, permitting the operation of any belt-driven farm machine that a 14 hp. gasoline engine will operate. The attachment is called the McGill Autopower, and is selling at \$75.

It is claimed that it can be attached or detached in 3 min. The power is taken directly off the crankshaft of the engine. It is equipped with a governor which operates on the carburetor, automatically regulating the gas. A friction clutch permits the engine being cranked before throwing into low. An auxiliary fan keeps the engine cool. The drive pulley is 10 in. in diameter with 5¼-in. crowned face. The shipping weight of the entire device is about 100 lb.

#### CYCLE TRADE REPORT

NEW YORK, Aug. 19—The third annual report of the United Cycle Trade Directorate has just been published.

## Growth of Society Shown by Roster

NEW YORK, Aug. 18—The growth and wide influence of the Society of Automotive Engineers, headquarters of which are here, are shown in the membership roster just off the press. A total of 4079 members of every class is given as of the date of June 30, 1919, when the list was compiled, with a company representation of 1696. This number is contrasted with the membership of Oct. 1, 1909, when the total was but 393.

Steady growth, with increasing membership, is shown and the number of new members for the preceding twelve months is given at 753. Membership in the association represents 42 of the States and the District of Columbia, as well as fourteen foreign countries, these being Argentina, Canada, Belgium, China, England, Finland, France, India, Ireland, Italy, Japan, the Netherlands, Scotland, Sweden and the West Indies. France leads in the number of memberships of every class, with 65, in this division.

The roster publishes the names of members in triplicate; first, alphabetically; second, by company affiliations, and third, geographically.

## FIRST YEAR BOOK OF M. A. M. A. PLEADS FOR CO-OPERATION

NEW YORK, Aug. 19—The first annual year book of the Motor and Accessory Manufacturers Association has just been issued and is in process of distribution to the members. Containing lists of the officers, members and a resume of the organization activities, it constitutes a record of the association that shows a present membership of 338 manufacturing firms in all parts of the Union.

The book contains brief forewords to the trade by M. L. Hemmings, general manager of the association, and Charles E. Thompson, the president, who also is president of the Steel Products Co. and the Glenn L. Martin Co., both of Cleveland. Thompson makes a plea for co-operation of the trade in solving the various problems before it, saying:

"Consider the excise tax; consider legislation generally affecting automobiles and airplanes; consider the great undeveloped fields of foreign trade; consider the development of national highways and better roads; consider railroad regulation and rates; consider labor and labor legislation; consider the scientific aspects of our industry; consider these factors and many more, and you will find that all of them can be met and handled only on a strong co-operative basis."

#### KELLY-SPRINGFIELD ORDERS

NEW YORK, Aug. 18—Contracts have been closed with the Kelly-Springfield Tire Co. by the Packard Motor Car Co. for its standard equipment for passenger cars and trucks; by the Federal Truck Co. for pneumatic tires exclusively; by the Winton Motor Car Co. and the White Motor Car Co. for standard equipment on their passenger cars.

## New Industries Open in Toledo

### Millions Spent on Factory Build- ings—Thousands of Employees Needed

TOLEDO, Aug. 15—Thirty-five new industries have been added to the industrial life of Toledo and thirty-three of the older plants have built extensions or purchased additional units since Jan. 1. The new industries are spending millions in erecting new plants.

Among the largest new factories completed or upon which work has been started are the Standard Oil Co., Ironville, which is to spend \$5,000,000 at once and probably \$25,000,000 within a few years; the Mountain Varnish & Color Works, West Toledo, \$1,500,000 factory; the Marleau-Bucklen-Schoen Co., \$500,000 factory; the Toledo Standard Commutator Co., \$450,000 factory.

Among the largest plants to expand or which have announced plans for immediate expansions are the Maumee Malleable Castings Co., Toledo-Chevrolet Co., Willys-Overland Co., Electric Auto-Lite Co., Toledo Screw Products, Toledo Shipbuilding Co., Toledo Bridge & Crane Co., and Doehler Die Castings Co.

## Stutz Earns \$653,742 In First Six Months 1919

INDIANAPOLIS, IND., Aug. 18—For the first six months of 1919 the Stutz Motor Car Co. of America showed net profits of \$653,742, equivalent to \$8.72 a share, compared with \$5.13 a share for the same period of 1918, earned on 75,000 shares of outstanding stock.

Net sales for the first half year were \$3,674,848, or \$1,738,891 larger than those for the first six months of 1918. Gross profits of \$730,926 were an increase of \$279,673.

The income account for the six months ended June 30, 1919, compares as follows.

	1919	1918	1917
Net sales.....	\$3,674,848	\$1,935,957	\$2,489,622
Cost of sales....	2,970,922	1,511,704	1,843,457
Gross profit....	\$703,926	\$424,253	\$646,165
Selling admin. and general expenses .....	88,304	35,374	50,317
Balance .....	\$615,622	\$388,879	\$595,848
Int. and disc. earned .....	38,120	9,187	25,927
Net profit 6 mos. ....	*\$653,742	\$398,066	\$621,775

The balance sheet as of June 20, last, compared as follows:

	1919	1918
<b>Assets—</b>		
Land and building.....	\$315,161	\$309,177
Machinery and fixtures...	305,240	216,532
Office furniture and fix- tures .....	4,274	3,464
Trade mark, good will and pat. ....	2,123,982	2,113,479
Cash .....	332,382	72,232
Accts. rec.—sight drafts..	224,458	140,577
Accts. rec.—subj. to ap- prais. of claim Bd. of Ord. Dept.....	59,436	.....
Mdse. inventory.....	660,780	890,789
Liberty bonds.....	51,000	25,000
Total.....	\$4,076,714	\$3,771,252
<b>Liabilities—</b>		
Capital stock.....	\$375,000	\$375,000
Accounts payable.....	128,546	68,662
Notes payable.....	.....	250,000
Deposits on cars.....	41,500	36,750
War tax on sale.....	19,891	.....
War chest.....	8,000	.....
Indiana National Bank....	.....	18,750
Reserve .....	467,478	*75,055
Surplus .....	3,036,298	2,947,034
Total.....	\$4,076,714	\$3,771,252

\*Includes war chest appropriation of \$12,000.

## CHANGE IN SUPER TREAD TIRE

SOUTH BEND, IND., Aug. 18—The Super Tread Tire Co. has been purchased by William Kahl and Fred A. Cator of Chicago, acting for Chicago and New York interests, at a consideration of \$1,000,000. Expansion of the business is contemplated with the organization of a new company with \$10,000,000 capital.

## Costs High To Run Trucks In England

Figures Just Published Are  
75 Per Cent Above the Pre-  
War Levels

LONDON, July 25 (*Special Correspondence*)—Some interesting data is published this week in a North of England daily paper, showing the present cost of operating motor trucks in this country. It is pointed out that, just now, working costs are more difficult to arrive at because of the changing conditions of trade and the labor market. Wages have doubled, gasoline is high in price and tires, repairs and maintenance cost much more than in pre-war times. These things and other conditions are not yet stable.

Generally speaking, operating costs are about 75 per cent above the pre-war level and, on that higher basis, the figures given below are presented. Three types of vehicles enter into the calculations—the light runabout van, the speedy, weight-drawing one-ton and the three-ton truck. The costs are based on a working week of five days, or 250 days a year, which allows time during the twelve months for overhauling and the execution of necessary repairs.

### Costs of Light Van

In the case of a light van (under 1000 lb.) it is shown that 10,000 mileage costs yearly £309 (\$1,545) and a 20,000 mileage £454 (\$2,270). In pence per mile, these totals are 7.4d (about 15 cents) and 5.4d (roughly 11 cents). To these figures must be added standing costs, which include depreciation on the vehicle and insurance. These bring up the total inclusive operative costs per mile, in pence, to about 8d (16 cents) for 10,000 miles and 5.95d (11 cents) for 20,000 miles. Repairs and maintenance (included in the foregoing rates) are debited at £26 and £39 (\$130 and \$195) yearly, and tires on a 5000 mile basis at £42 and £84 (\$210 and \$420).

### Record for One-Ton Lorry

The one-ton (2240 lb. being the British or long ton) lorry, with pneumatic tires front and solids rear, on an annual mileage of 10,000 costs £410 (\$2,050) and on 20,000 miles £626 (\$3,130) or 9.8d (19 cents) and 7.5d (about 15 cents) per mile. Taking all costs, including insurance and depreciation, the figures are per mile 11.76d (about 23 cents) and 8.68d (about 17 cents). For 10,000 miles, repairs and maintenance for the year cost on a 10,000 miles basis £65 (\$330) and on a 20,000 mile basis £94 (\$470).

For a 3-ton lorry, a 10,000 yearly mileage shows a total cost of £549-10 (\$2,747.50) and a 20,000 mileage £875 (\$4,375) or 13.04d (26 cents) and 10.5d (about 21 cents) running costs per mile, or inclusive of depreciation and insurance, 16.55d (about 33 cents) and 12.31d (about 25 cents) per mile.

## Farmers Show Interest in Tractor Achievements



SEDALIA, MO., Aug. 18—The tractor demonstration at the Missouri State Fair here last week had an attendance on certain mornings of as many as 5000 farmers.

The unusual feature was the neglect of the tractor itself and the attention to the actual work. Most of the spectators roamed over the field looking at the earth as it was turned and judging the

quality of the plowing. They appeared to judge the tractor only by results. The same was true of the belt work.

The criticism offered by these farmers was that two hours of plowing was not enough. They wanted to see at least five hours at a stretch. When a tractor stopped they did not inquire why, but merely timed it. Twenty makes of tractors were exhibited.



## Tractor Exhibit Attracts 25,000

Western New York Has Biggest  
Demonstration in East, with  
Official Records

HOLCOMB, N. Y., Aug. 14 (*Staff Correspondence*)—A tractor demonstration which put to shame the national meeting at Wichita—from the standpoints of records, attendance and educational propaganda—was held in this town, in the heart of New York's wheat belt, yesterday and to-day.

Under the auspices of the Farm Production Bureau of the State Department of Farms and Markets, painstaking tests were made of fuel consumption, speed, furrowing, stops and their causes and general performance, in a 2-hr. plowing test. These records will be published through the county farm agencies, reaching agriculturists of the entire state.

In addition to the plowing, twelve tractors, representing ten makes, tilled a 60-acre field and operated various types of traction and stationary farm machinery, all under observation of the state authorities.

In the plowing test the tractors used standard fuel, placed in the tanks and measured by inspectors. They were held to an entered plowing speed considerably below their maximum, to prevent "stunts," and were allowed only one operator for both the tractor and the plow, except that a plowman was permitted to accompany the machine on the first furrow.

Situated several miles from railroad and trolley lines and far from the larger cities of western New York, the demonstration attracted virtually none but farmers, whose number aggregated 25,000 for the two days—an attendance said by veteran tractor men present to have been the greatest in the history of the industry east of the Mississippi.

The demonstration was held in the heart of New York's prosperous wheat belt, where 1000 of the 6000 tractors in operation in the state are owned in Ontario County alone.

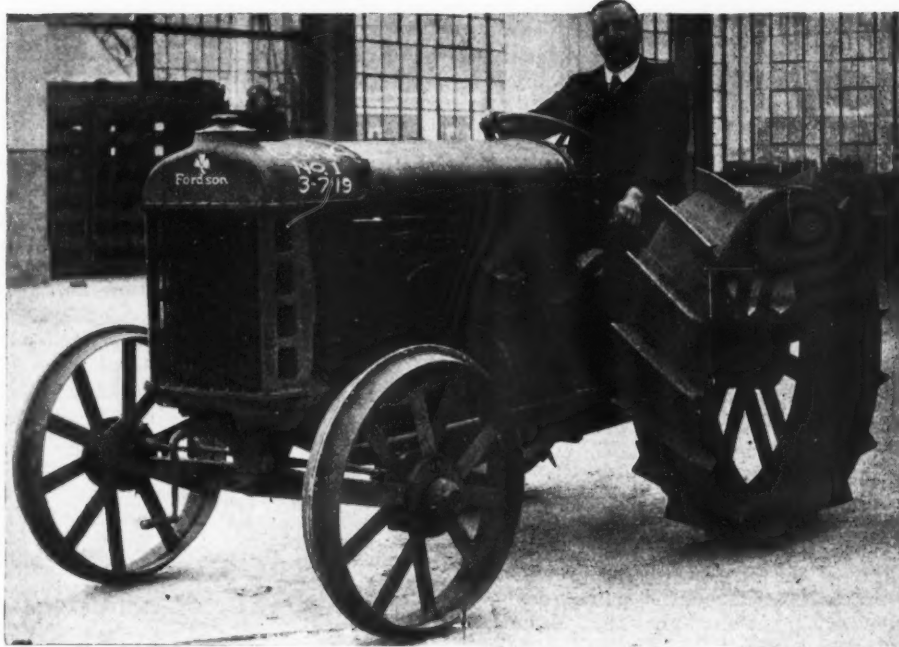
### TRANSCONTINENTAL TRACTOR TRIP

BUFFALO, N. Y., Aug. 18—The Wheat tractor, a product of the Hession Tiller & Tractor Corp., which started on its transcontinental journey to Los Angeles, Cal., on May 29, has been reported as far as Pueblo, Col. It remained a week in Wichita, Kan., for the National Tractor Demonstration.

### PERMANENT TRACTOR EXHIBIT

NEW YORK, Aug. 18—A large part of the space for the International Farm Tractor and Implement Exchange to open Oct. 15 at the Grand Central Palace has been contracted for. It will be one of the permanent exhibits of the Merchants' and Manufacturers' Exchange, owned and controlled by the Nemours Trading Corp.

## First Fordson From Cork Factory



Our English correspondent makes the following remarks in connection with the above photograph: "Henry Ford & Son has turned out its first Fordson tractor from its new and still incomplete factory at Cork, in the south of Ireland. Cork, or rather Queenstown, the pleasantly situated cove on the headland at the entrance to Cork Harbor, is the first place an American visitor sets foot on in Europe, and it is the last sod the emigrant treads on his journey to the Far West.

"There is something fitting in the fact that Henry Ford, himself the son of an emigrant Cork man, should blend these two associations by building his first European factory at Cork.

"The picture shows the first tractor from that factory, on which it is stated Ford is spending a million dollars. Already he has earned every title to the deepest respect from the Irish people, and has shown that his aim is to play the game."

## Tractor Show Draws Criticism of British

LONDON, July 28 (*Special Correspondence*)—The autumn tractor trials of the Society of Motor Manufacturers and Traders, Ltd., will be held Sept. 24 to 27 at Carlton, near Lincoln, and will include a show of traction and tractor implements, as well as competitive plowing demonstrations. The exhibition will be held in the local aerodrome. The charge for space is 24 cents per square foot.

Apparently, all the exhibitors are to get for their outlay is the right to be in the building, as all expense for stands and decoration, conveying and taking away the exhibits, their safe custody during the exhibition, and making good of any damage incidental to their showing, is to be met by the exhibitors.

Moreover, the exhibitors will not be allowed to remove their exhibits after the exhibition without a pass, or until the exhibition manager thinks fit to permit them. The committee in charge also claims the right to refuse admittance, or to remove any exhibit, without having to assign a reason for doing so.

Exhibitors will not be allowed to advertise their exhibits or other wares excepting in the exhibition catalog, by leaflets, etc., handed from their stands.

Such an exhibition is not likely to

tempt many to repeat the experience, for the list of don'ts is in striking contrast to the liberty and encouragement given to exhibitors at the shows of the Royal Agricultural Society. Next year the Royal body will hold a tractor demonstration on its own account and it has refused to be associated with the Motor Traders' coming show on the ground that there will not have been enough time for British firms to get their tractors ready for such an event.

At the Scottish tractor trials in the autumn of 1917, under the auspices of the Board of Agriculture (Scotland) and the Highland Agricultural Society (Scotland), the machines were transported to and from the grounds at the cost of these bodies and also between the three sites of these trials at Edinburgh, Glasgow and Perth, and fuel and oil and other requirements were freely provided.

### PHARIS TIRE ENLARGES

COLUMBUS, O., Aug. 18—The Pharis Tire & Rubber Co., of Newark, O., has purchased an additional five acres of ground of canal property on which will be erected a large addition to its plant. The addition will give 45,000 sq. ft. of floor space and will be used chiefly in the manufacture of cord tires. With the completion of the building the company will have an output of 1000 tires and 1000 tubes daily.



## Analyzes British Light Car Market

Artisans Offer Field for Sales  
Not Possible Before  
War

LONDON, Aug. 5 (*Special Correspondent*)—A recent American estimate gave the rate of cars per head of population in Great Britain as 1 to 225. The potentiality of the car market in Great Britain can hardly be discussed with reasonable accuracy or any numerical conclusions arrived at on the usual methods of assessment and computation, because of the changing relations of capital and labor and the unstable financial conditions pending reformations of the coinage and rate of exchange. However, there is some source of information to be found in the recent official evidence at the income tax inquiry of the Royal Commission.

### Income Tax Payers Number 32,000

At present there are 3,500,000 payers of income tax and 59,000 who pay a supertax on their taxable incomes. The amount obtained is £338,000,000 (\$1,690,000,000), of which £8,000,000 (\$40,000,000) are from weekly wage earners, the 59,000 supertax payers, be it added, contributing £42,000,000 (\$210,000,000). In the absence of the number of workers concerned in this \$8,000,000 contribution, it seems safe for our present purpose to assess the incomes earned at £250 (\$1,250) per head, remembering that £5 (\$25) per week, and much more in some cases, is being paid to skilled mechanics, either directly as wage or as a supplement. Used as a divisor, this sum denotes that there are 32,000 contributors to this tax.

### Market for Popular Priced Cars

It would seem, therefore, that there is a very large potential market for motor cars at a popular price among a class which, before the war, did not contribute an income tax to any notable extent. Allowing only 50 per cent of the above number as potential owners, there are over 16,000 possible new motor car owners among a class that hitherto has hardly motored at all. The belief here is that in the United States it is the exception to find an artisan in the higher categories who is not a motor-car owner. In Europe, the exception is the opposite.

The question suggests itself, who is to cater for this trade? Two present sources are open, the one is, to all intents and purposes, American, and the other is the possible and almost certain enterprise of the co-operative societies, which are increasingly strong here.

Much is heard about mass output, but so far little seems shaping to that course in Great Britain. The home market and the home manufacturer cannot afford a second Ford conquest, or, to be exact, a third attack from that quarter, for the Ford interests here have now a monopoly of the light-van trade, it being estimated

there are nearly 30,000 Ford vans over here. Though little has been heard lately of the venture of the Manchester Co-operative Society in motor vehicle making, it must not be overlooked that this body has ready at hand the weapons needed to resist the American bid for this artisan-car trade.

## Many Planes In Race New York to Toronto

NEW YORK, Aug. 21—Many makes of airplanes, both American and foreign, will compete in the round trip New York-Toronto handicap and speed race, the start of which is set for 10 o'clock the morning of Aug. 25. With entries not yet closed, it was announced to-day by officials of the American Flying Club, one of the organizations promoting the event, that at least forty civilian and army machines would represent the United States. The army will enter the following makes:

American: C.H.-4, Martin Bomber, Ordnance Scout, Honeymoon Express (converted three-seater D.H.), Vought, D.H.-9, D.H.-9a, Lapere, Loening (monoplane), Thomas-Morse Scout 80 hp.; Thomas-Morse Scout 300 hp. and Curtiss J.N.H.

British: S.E.-5, S.E.-5a, Avro and Bristol Fighter.

French: Spad and Breguet.

German: 2 Albatros, 1 Fokker, 3 Pfalz, 1 L.V.W. and 1 Halberstadt.

Civilian entries have been made representing the L.W.F., the Curtiss, the Sopwith and the Avro.

Trophies and prize money will be given both for performance and speed, the former being determined on a basis of the formula:

$$\frac{\text{Flight Load}}{\text{Horsepower}} \times \text{Speed.}$$

Starts will be made simultaneously from Roosevelt Field, Long Island, and Leaside, Toronto, by the American and Canadian planes. Obligatory stops must be made at Albany, Syracuse and Buffalo, and four days are allowed for the circuit, which totals about 1040 miles.

### APPERSON ADVANCES PRICES

KOKOMO, IND., Aug. 19—Due to high labor and material costs, the Apperson Bros. Automobile Co. raised the prices on its Standard 8-20 seven-passenger and four-passenger sportster \$325, from \$2,625 to \$2,950; its Anniversary seven-passenger touring and four-passenger tourster remaining \$4,000.

The enclosed models of its Standard chassis will list at \$4,000 in all types, namely: seven and six-passenger sedan; four-passenger, two-door coupe, three-passenger, two-door coupe, and four-passenger, four-door sedanette. The Anniversary enclosed jobs are priced at \$5,500.

### BRITISH LINENS FOR SALE

NEW YORK, Aug. 16—The surplus of 43,000,000 yd. of British aircraft linen sold by the British Government in June to Leonard J. Martin for about £4,000,000 (\$20,000,000) is being offered for sale.

## Duesenberg In New Willys Corporation

Production of New Six Expected  
at Elizabeth—Announced  
Briefly

NEW YORK Aug. 21—Announcement that the Duesenberg Motors Corp. was one of the subsidiaries of the new Willys Corp., the formation of which to contain the holdings of John N. Willys was made public last week, was made here to-day by officials of the Duesenberg company. The announcement, although brief, indicated that the proposed six-cylinder Willys car, already designed by the Willys-Overland interests, would be produced at the Duesenberg plant.

The plant of the Duesenberg company is located at Elizabeth, N. J., with general offices in this city. It has been a subsidiary corporation of the American Can Co. No details of the financing involved in the transfer were announced, except that the Duesenberg company was completely taken over by the Willys corporation.

Production of the Willys Six in a factory outside of the Toledo plant of the Willys-Overland Co. already had been forecast, but its location had not been given out previously. It is believed production will be under way shortly and that the car soon will be placed on the market.

Confirmation also was obtained to-day that the Electric Auto Lite Co. of Toledo and the New Process Gear Corp. of Syracuse, N. Y., also were units of the Willys corporation.

## "Joly" Spark Plug Will Be Distributed in New York

NEW YORK, Aug. 20—The Lyons Ignition Co. has opened an office at 215 Fourth Avenue for the distribution of the "Joly" spark plug. The office is in charge of W. Earle Clayton, recently general manager of the Derf Manufacturing Co., Inc. He resigned to become first vice-president and commercial manager of the Lyons company.

This company was recently organized by Dr. E. Cadgene, president of the Lyons Piece Dye Works of Paris, and manufacturer of the "Joly" plug in that country. For the last four years the output of this plug has gone entirely to the French Government for airplane use.

The American factory is in Paterson, N. J., and the output has reached 3000 a week. Buildings under way will permit the output to be increased to 5000.

### STANDARDS DIVISION TO MEET

NEW YORK, Aug. 21—Opening of the fall activities of the standards divisions of the Society of Automotive Engineers was forecast by the announcement here to-day that the first meeting of the iron and steel division of the committee would be held Sept. 16. F. P. Gilligan of the Henry Souther Engineering Corp., Hartford, Conn., is chairman of this division.

## Car of American Parts To Be Made In Sweden

Difficulty in Finding Suitable  
Light Engine—Germany  
in Production

DETROIT, Aug. 16—A. G. Gullberg, general manager of the Swedish Automobile Mfg. Co., Bollnas, Sweden, is here trying to purchase several hundred 18 hp. engines having a bore and stroke of 3 x 4½. The engines are for a light automobile of the cyclecar type which he has designed and is about to manufacture. The car is to sell at about \$1,400. It will be assembled at the Swedish plant from parts manufactured in the United States. The company hopes to run 500 cars in 1920.

Gullberg, however, has encountered difficulty in finding a suitable light engine. He states that if he is unable to locate a company already in production of such an engine his company will either be obliged to design and build the engine or change the design of its car to accommodate a larger power-plant.

There is a big demand for automobiles in Sweden, especially American machines, he says. A few French machines are on the market, but the price is so great as to make them purchasable by the wealthy class only. Three or four German companies are getting into production, according to Gullberg, and will have cars out this fall. One of these German concerns is the Adler Co., which is about to resume the manufacture of a high priced car.

Gullberg says the greatest handicap confronting the German automobile manufacturer is the tire shortage. Germany is practically bare of tires and other rubber goods. Unless the American tire companies come to the assistance of the German automotive industry, this tire shortage will hold up German production many months.

As far as Sweden is concerned, German cars are likely to receive a cold reception on the Swedish market. This is due to the discrimination of the people against German goods. Also the prices of all foreign cars are prohibitive, while American cars are the cheapest on the market. Out of a total of 5000 automobiles in Sweden, 4000 are of American make. The rest are French, British and German machines.

### ITALIAN AIRMAN HERE

WASHINGTON, Aug. 15—The efficiency of the Italian dirigible O-9 type will be demonstrated to the U. S. Navy officials next week by Lieut. Senor Angelo Varoli Piazza, R. I. N., one of Italy's greatest war heroes.

### WOULD IMPROVE AERO FIELDS

WASHINGTON, Aug. 16—Acquisition by the War Department of certain of the sites now being used as aviation fields was proposed in an administration bill introduced yesterday by Chairman

Wadsworth of the Military Committee. The fields proposed to be purchased included March, Mather, Ream and Ross fields, Calif.; Ellington, Kelly No. 2 and Brooks fields, Texas; Park field, Tenn.; Selfridge field, Mich.; Chanute field, Ill.; Chapman field, Fla., and the repair depot in Montgomery County, Ala.

The bill, which was referred to the Military Committee, would appropriate \$1,250,000 to continue permanent construction at Rockwell field, Calif., and at Langley field, Va.

## New Liberty Motor With 24 Cylinders

DAYTON, OHIO, Aug. 18—A test has just been made at McCook Field here of a 24-cylinder Liberty engine, composed almost entirely of parts of the Standard Liberty twelve. The Liberty twenty-four might be said to be composed of two Liberty twelves, with the crankcase bottom half taken off, bolted together, although, of course, there is only a single crankshaft, and special connecting rods had to be made. Some slight changes were required also in the crankcase upper half.

An output of 673 hp. was obtained, as compared with 400 hp. from the Liberty twelve. This gives a specific weight of 1.97 lb. per hp., as compared with 2.11 lb. per hp. for the twelve. The specific fuel consumption on the twenty-four was somewhat greater than on the twelve, viz., 0.55 lb. per hp. as compared with 0.51 lb. per hp. It is believed that an engine of this type could be used to advantage with a large slow-speed propeller without gear reduction, thus increasing the efficiency of the propeller.

### TRANSCONTINENTAL FLIGHT STARTS

NEW YORK CITY, Aug. 16—The first airplane of the All-American Pathfinders' squadron left Hazelhurst Field, L. I., yesterday afternoon at 2 o'clock, starting on its transcontinental flight to San Francisco. Lieut. Kenneth C. Leggett, of the Department of Aerial Information, was pilot, and Lieut. Carl D. Gunther of the same department was observer. This machine will act as pioneer for the seven other machines of the squadron, reporting back by wireless. Under present plans, four more airplanes will start today, and the other three to-morrow.

### AERIAL MAIL FOR COLOMBIA

WASHINGTON, Aug. 15—The Colombia Government will let to the lowest bidder contracts for the carriage of mail in airships between the capital and certain other places in the Republic, according to information received by the Department of State from the local Colombia Legation.

The bidding will take place in Bogota on Nov. 2. A circular setting forth the proposed contracts may be inspected at the Washington office of the Bureau of Foreign and Domestic Commerce by referring to file No. 120567.

## Canadian Industry Wants Improved Light Cars Made

TORONTO, ONT., Aug. 16—The Ontario Department of Highways' annual report issued a few days ago shows that of 101,599 passenger cars owned in the province last year, 84,018 were listed as of 25 hp. and less. This fact bears out the claim that three out of four persons buy light cars.

With the passing of all war-time restrictions, Canadian industry is applying itself with vigor to producing more goods for both home consumption and export. In this business stimulation, perhaps, none shows more marked activity than the automotive industry. With Ontario alone possessing more than 100,000 cars, and increasing faster than 25 per cent a year, the opportunity for quantity production in Canada seems to have arrived.

In order for the motor car industry in Canada to approach that point where it would meet the demands of the home market, it is claimed that manufacturing stress must be put upon light cars. There is an attendant economy of operation, but this must be included in the price consideration. If a car embodying the riding advantages of a heavy car could be produced on a light chassis, at a moderate price, the present 84 per cent preference, it is believed, would be much increased.

### NEW BRISTOL MOTOR INTERESTS EXPERTS

WASHINGTON, Aug. 15—An interesting aerial demonstration took place recently at Filton, near Bristol, England, when experts witnessed a flight by the latest British-made biplane, a Bristol fighter, with the newest Bristol-made aerial engine. The machine was said to be a superfighter designed for bombing. The engine develops 450 hp., with 9 air-cooled cylinders, and a weight of 636 lb. The machine is built to fly about 150 m.p.h. A patented air system does away with weight and attendant troubles of water. It has been approved by the British Air Control Board and adopted by large airplane firms. The results of the trial flight were reported as being entirely satisfactory.

### AIR LINE FOR THE CONGO

WASHINGTON, Aug. 16—The creation of a line of hydro-airplanes for the Congo Colony has been decided upon by the Belgian Committee on Aeronautics. Besides mail and passenger transport, hydro-airplanes are to undertake an important cartographic mission covering thousands of miles, with a view to establishing the cartography of the Congo river.

### BRITAIN OFFERS AERO PRIZES

WASHINGTON, Aug. 15—The British Government will offer prizes amounting to £64,000 for airplane competition in order to develop safer types of machines, Major General Zeley of the Air Ministry announced in the House of Commons today.



## New Selden Model Of 3½-Ton Truck

ROCHESTER, N. Y., Aug. 15—A new 3½-ton truck to be known as model A is announced by the Selden Truck Sales Co. This takes the place of Model NL, which has been discontinued.

Although the features embodied in model NL are, generally speaking, embodied in its successor, there are a number of minor improvements tending to insure maximum efficiency. A feature of the new chassis is the use of a fully flexible frame, the flexible mounting of all units, flexible radius rods and a gear-set located amidships which is designed for all types of power take-off. The former model had a semi-flexible frame. No rivets are used, all brackets being held by bolts.

The chassis is made in three lengths and three wheelbases, the standard being a wheelbase of 162 in., with 153 in. back of driver's seat. This is listed at \$3,850. Model A-16, furnished at extra cost, has a wheelbase of 190 in. with 192 in. behind the seat.

The engine, as formerly, is a 4-cylinder 4½ x 5½ in. Continental, but it is special in the sense that in the new model it is mounted at the front around the starting crank housing and at the rear it is supported by a heavy pressed steel member bolted to a flange on the crankcase. This member is so attached to the frame as to compensate for and eliminate undue strains due to weaving. Clutch and gearset are new Brown-Lipe design, the latter having special gear ratios giving maximum pulling power at low speeds to counteract the higher gear ratio in the rear axle to get high speed on direct drive. Tires are 36 x 5 and 36 x 10, the latter replacing the 36 x 5 dual fitted to model NL.

## Jumbo Trucks Built on Slightly Heavier Lines

SAGINAW, MICH., Aug. 15—The Nelson Motor Truck Co. announced to-day changes of construction along slightly heavier lines, making possible an increase in the rating of Jumbo Model D from 4000 to 5000 lb. Several equipment improvements also were announced, including installation of a new lubricating system. The chassis price has been increased from \$2,500 to \$2,700.

Two new Jumbo models will be announced soon of 1½ and 3½-ton sizes, each to be supplied in three wheelbase lengths.

## NEW AXLE FOR TRUCKS

CLEVELAND, Aug. 16—A new \$1,500,000 corporation has been formed to manufacture the double reduction truck axles developed by Leo Melanowski, who has been working on them for some time.

The corporation, known as the L. M. Axle Co., was formed July 23, and purposes manufacturing three different types of axles with 1½ to 3 ton capacity. In one of the models the axle housing

is of special aluminum alloy which has been developed by the Aluminum Casting Co. and makes an axle with wheels ready to put on the tires, weighing 495 lb. The other two models use steel castings in place of lynite.

The original L. M. Axle Co., capitalized at \$25,000 and used for organization purposes, has been increased to \$1,500,000, of which \$1,000,000 is 7 per cent cumulative preferred shares of \$100 par value. The \$500,000 is in common shares, \$10 par value. The preferred is offered at par with a bonus of one share of common with each share of preferred providing 10 or more shares are taken.

## British Accessory Maker Gets M. L. Magneto

LONDON, July 28 (*Special Correspondence*)—An important fusion of two leading British motor trade houses is that of the M. L. (Morris-Lister) Magneto Co., Inc., Coventry, and S. Smith & Sons, Ltd., Great Portland Street, London, now under way. The Smith company has acquired a controlling holding in the M. L. company, and will have an effective selling control over the M. L. series of magnetos.

S. Smith & Sons, in the accessories trade and hitherto not exclusively concerned with motor accessories, came into the motor trade from the time-piece industry. Speedmeters and mileage recorders made by an outside firm were the company's first motor trade line, but for the last ten years or so they have built these and other lines. More recently they built a new works at Cricklewood in N. W. London, to which probably most of the present production plant at the Great Portland Street works will be transferred.

The M. L. magneto factory has been adapted, rather than built, for its present purpose. It would not be surprising if the M. L. magneto business were transferred to Cricklewood, and be merged in the Smith output of dynamos and starters, the company having acquired the Trier-Martin patents in these machines.

A feature of the M. L. magneto is laminated pole-shoes, in place of the hitherto mainly used solid shoes of soft-iron. Very good results have followed from this change; the M. L. magneto being notably responsive at slowest armature speeds, without recourse to the usual lip extension pieces, or staggered lips as used by the older magneto makers to obtain good sparking at slow armature speed.

## HAYNES DECLARES DIVIDEND

Haynes Automobile Co., Boston, quarterly dividend, 1¼ per cent on preferred, payable Sept. 1 to stockholders of record Aug. 20.

The company will soon erect a new factory at Kokomo, Ind., which will increase floor space 300,000 sq. ft. A production of 15,000 cars per year is planned.

## Trucks Show Worth In Western Mud

### Transcontinental Train Has Little Mechanical Trouble, De- spite Obstacles

NEW YORK, Aug. 14—Road conditions and operative obstacles, seemingly almost impassable, that have been met by the transcontinental train of the Motor Transport Corps were described in dispatches received here concerning the progress of the convoy, now making its way through Wyoming after having successfully crossed Nebraska. Although two days behind schedule, due to the unexpected mud, the train has suffered little mechanical trouble and is continuing without interruption its onward course.

The roads of western Nebraska tried the train in the severest manner. Often the big trucks were buried almost hub deep in the mud or quicksand so that only the combined efforts of men and tractors were able to pull them through. One day last week saw an advance of no more than twenty-five miles in nine hours and at another time only twenty-one miles were passed in six hours. Roads and bridges have had to be built and passageway literally cut through the mud and sand.

But the train has met the test in a manner worthy of laudation. One motorcycle had a broken front fork last week and one of the passenger cars developed carburetor trouble that necessitated changing. The most serious mechanical accident was the blowing out of an engine head gasket on one of the trucks. Otherwise the train has come through the grind with only slight trouble.

In addition to proving the worth of the equipment, the train also is proving the need of a real transcontinental highway. For military purposes, the difficulties found demonstrated the great need for an improved highway, as any operations over some of the stretches encountered would be practically impossible.

## ENLARGE MILWAUKEE PLANT

MILWAUKEE, WIS., Aug. 15—The E. & W. Mfg. Co., 325-335 Oregon Street, Milwaukee, is building a two-story addition, 50 x 100 ft., to relieve the crowded condition of its present works, devoted entirely to the production of commercial car attachments for passenger car chassis. Frank J. Edwards, formerly Kissel Kar distributor and now representing the Dodge, founded the concern about five years ago, since which time it has become one of the largest makers of this class of automotive equipment in the Middle West.

## NEW FOUNDRY PLANT

MILWAUKEE, Aug. 16—The Jaeschke Bros. Foundry Co. will build a new plant costing \$175,000. The new casting shop will be 150 x 180 ft. and the core building 54 x 190 ft.

## English Feel Pinch Of Low Production

### Foreign Markets Being Lost— Embargo Causes Unusual Im- port Conditions

LONDON, July 28 (*Special Correspondence*)—Buyers are beginning to complain of being robbed in their purchases of used cars at the high prices until now prevalent. However, there is evidence of this sort of profiteering having reached its zenith, and many people are noting a falling tendency.

Meanwhile, the supply of new models is filtering through so slowly as to make it appear that some manufacturers are looking hopefully to the nearing close of the production season as a natural measure for cancelling orders that manifestly cannot be delivered this year. What these men are more concerned about is the impossibility, at least in some cases, of getting any cars this season to the British overseas markets.

#### Increasing Importation of Unknown Cars

The failure to export cars is not serious because of the loss of sales, but on account of the increasing loss of prestige abroad and the knowledge that Americans, in particular, are more and more rooted there. This will mean that, with next season's after-war designs coming through, sales work practically of an entirely new effort will be needed instead of, as was hoped, the revival of orders from a merely suspended business.

One manufacturer, referring to this difficulty, recently said he willingly would cut his home country orders for this season to get his cars on the overseas markets.

The increasing importation of unknown cars is causing much comment here.

The term "unknown," as used in England, merely implies that the cars concerned are new to this country, not having been dealt in here before the war. Since the war ended, probably half a score of such makes have been imported.

#### Government Limits Imports

The situation is curious. On the one hand, the government is doing, or claims to be doing, all it can to prevent import of cars and has ruled that only 5/12 of 50 per cent of any make imported here in 1913 are to be admitted up to Sept. 1, 1919, with the result that firms like Overland, Studebaker and Maxwell will have hundreds of unfilled orders at the end of the season, while on the other hand various concerns are being allowed to import one or two samples of the unknown cars on the condition that they will not be sold without permission.

It is true that the importation of a few of these cars would not affect the net result as regards the over-sold imports of the older makers, but it is mischievous because the papers print descriptions of these cars. These mislead the public as

to the actual condition of things and keep alive the interest of the supporters of the embargo in their crusade, ostensibly national and protective in aim, but in some cases, it is to be feared, merely a pretext to enable them and other British makers to ring prices.

Meanwhile, it is noted that the London Times is voicing complaint as to the fallacy and deception in some cases of listing merely revised 1914 cars as "post-war" models.

The number of genuine post-war productions can be counted on the fingers of one hand, omitting necessarily the few makers of genuinely new lines that so far do not exist commercially. The prospects of these latter cars seem hopeless for two reasons:

1. The high prices ruling and likely to remain for at least a season, which even the big makers find scarcely cover the production and present overhead costs.

2. The trend towards mass production everywhere. Mass production is for cheapening a given output, and the new cars referred to are not of the sort selected for this class of output until altered radically.

As regards the present cost of production, an engineer at one of our largest works declared last week that his company is paying 63s. (\$13) a pair for cylinder castings which before the war cost 25s. (\$5) from abroad, and that labor is costing 150 per cent and materials about 130 per cent above pre-war rates.

### Gray-Dort to Be Made by Combined Companies

CHATHAM, ONT., Aug. 16—The amalgamation of the Gray-Dort Automobile Co. and the William Gray & Sons Campbell Co. has been effected. Robert Gray, who is president of both companies, will be the president of the new company. It is the intention to devote the entire three plants of the new company to the manufacture of the Gray-Dort car. Production will be increased two and a half times the present output.

#### VAN SICKLEN TO TRIPLE OUTPUT

ELGIN, ILL., Aug. 18—The Van Sicklen Speedometer Co., which recently was reincorporated, is to have a capital of \$2,500,000, as compared with \$250,000 for the old company. Norman B. Church, who will be chairman of the board of directors, has been largely in charge of the reorganization. All the old stockholders retain their interests, among them being John N. Willys, C. H. Hurlburt, Ernest A. Hamil, George M. Holley, T. F. Sheridan and A. D. Edwards. N. H. Van Sicklen, Sr., will be president and N. H. Sicklen, Jr., and Charles Van Sicklen, his sons, vice-president and secretary respectively. Chester B. Braselton will be a vice-president and director.

The company has contracts for 2500 speedometers a day, which will nearly triple the output, and will supply twenty-nine motor car companies.

### Fiat Doubles Stock To Modernize Plant

NEW YORK, Aug. 15—Doubling of the capital stock of the Fiat company, from one hundred million to two hundred million lire, was announced here to-day by New York representatives of that car. This action was taken recently at a special general meeting at Turin, Italy, the home of the Fiat.

This increase in capital has been decided on in order to transform and modernize many of the present shops with a view to efficiency and economical output and the consequent lowering of the price of cars. Other work to be carried out comprises an increase in electrical power for the rolling mills and steel works of the company. An increased capital is also required to enable the company to take up interests either in Italy or abroad to prepare the automobile markets for commercial expansion.

### More Cars Announce Advance in Price

DETROIT, Aug. 18—Effective at once are the changes in price announced by the Cadillac Motor Car Co. which increase the price of all open models \$270, and provide for an advance of \$235 on the sedan, \$350 on the Victoria and \$220 on the Limousine, making new prices compare with old as follows:

	New Price	Old Price
2-passenger Touring	\$3,490	\$3,220
4-passenger Touring	3,490	3,220
7-passenger Touring	3,490	3,220
Sedan	4,450	4,215
Victoria	4,140	3,790
Limousine	4,740	4,520

INDIANAPOLIS, IND., Aug. 18—Open models of the Cole Motor Car Co. have been advanced \$155. Closed bodies were erroneously reported to have advanced \$200. They remain the same in price, as follows:

	New Price	Old Price
4-passenger Touring	\$2,750	\$2,595
7-passenger Touring	2,750	2,595
Roadster	2,750	2,595
Sportster	2,750	2,595
Sportsedan	3,895	3,895
Sportosine	3,995	3,995
Sportcoupe	3,795	3,795
Tourosine	3,995	3,995
Toursedan	3,995	3,995
Towncar	3,895	3,895

COLUMBUS, O., Aug. 15—An increase of \$100, to \$1,395, was announced here to-day for the new Allen Model 43, by the Allen Motor Co., maker of the line.

#### CONSULTING MATHEMATICIANS

NEW YORK CITY, Aug. 15—Dantzig, Pfeiffer & Ritt have organized a firm of consulting mathematicians, claimed to be the first organization of its kind to enter the commercial field. They will endeavor to solve mathematical problems in mechanism, diagram and chart work, and problems in aeronautics among other investigations.



## PROGRAM OF SAFETY COUNCIL

CLEVELAND, Aug. 18—In connection with the general subject of accident prevention, the eighth annual safety congress of the National Safety Council to be held here October 1-4, there will be two meetings of the automotive section.

The first general session will be devoted to a discussion of employees' representation under the following sub-

heads: Co-operation and Industrial Progress; Labor Management and Collective Bargaining; Practical Aspects of Employees' Representation and Employees' Representation from the Standpoint of Organized Labor.

Robert E. Coleman, director of personnel for the Pierce-Arrow Motor Car Co., Buffalo, N. Y., has been nominated as one of the directors of the National Safety Council.

United States Exports of Cars, Trucks and Parts, by Countries,  
During June, 1919

Countries	Commercial		Passenger		Parts Value
	Number	Value	Number	Value	
Azores and Madeira Islands	..	..	187	\$196,120	\$192
Belgium	12	\$42,069	687	735,559	10,603
Denmark	102	223,892	6	7,380	9,918
Finland	..	..	108	404,407	78
France	442	1,595,841	30	62,126	366,331
Greece	10	36,600	1	4,155	18,545
Italy	..	..	144	161,941	354
Netherlands	7	13,273	332	388,692	55,351
Norway	115	289,330	38	47,150	27,281
Portugal	2	4,014	170	93,786	3,812
Roumania	45	23,020	..	..	56,618
Serbia, Montenegro, etc.	2	1,500	181	226,865	350
Spain	19	18,896	207	226,379	16,165
Sweden	26	44,595	3	10,500	5,432
Turkey in Europe	..	..	382	427,387	332,444
England	..	..	1	1,634	925
Scotland	..	..	63	55,614	283
Ireland	..	..	2	1,703	306
British Honduras	..	..	1,329	1,232,011	1,949,807
Canada	217	326,360	7	3,650	282
Costa Rica	1	504	5	6,459	1,756
Guatemala	..	..	..	..	960
Honduras	..	..	8	7,608	3,214
Nicaragua	..	..	10	9,609	12,162
Panama	1	600	7	12,420	1,492
Salvador	..	..	217	159,880	79,927
Mexico	109	169,602	..	..	186
Miquelon, Langley, etc.	4	4,000	34	38,055	2,678
Newfoundl'd and Labrador	..	..	5	4,360	9,546
Barbados	2	4,150	3	3,590	3,493
Jamaica	20	10,065	24	19,784	15,985
Trinidad and Tobago	3	1,906	4	2,743	2,903
Other British West Indies	70	215,016	188	179,331	198,026
Cuba	..	..	6	4,907	3,671
Danish West Indies	..	..	1	483	672
Dutch West Indies	1	504	36	41,193	10,955
French West Indies	16	15,493	46	39,657	2,844
Haiti	1	1,735	4	5,200	13,754
Dominican Republic	5	16,356	164	295,864	509,012
Argentina	14	25,358	1	1,431	414
Bolivia	..	..	268	198,544	114,468
Brazil	12	23,748	28	21,379	84,337
Chile	2	4,690	8	11,179	1,810
Colombia	..	..	6	4,886	2,315
Ecuador	..	..	5	3,461	4,574
British Guiana	..	..	..	..	25
Paraguay	4	10,320	14	17,048	13,501
Peru	29	21,595	284	194,378	19,487
Uruguay	..	..	16	13,802	14,361
Venezuela	1	922	10	9,791	2,828
Aden	56	103,565	118	116,961	15,596
China	1	1,335	8	7,346	19,280
Japanese China	..	..	..	..	878
Chosen	39	64,518	367	407,537	49,295
British India	20	26,309	60	71,304	29,749
Straits Settlements	..	..	42	48,279	1,240
Other British East Indies	26	57,440	236	311,196	32,766
Dutch East Indies	..	..	14	14,086	2,116
French East Indies	..	..	301	240,531	1,825
Hongkong	88	148,304	..	..	53,822
Japan	..	..	8	10,720	928
Russia in Asia	5	10,798	..	..	981
Siam	1	580	..	..	100,617
Turkey in Asia	87	109,737	429	447,026	69,638
Australia	33	73,860	224	250,478	610
New Zealand	..	..	3	2,760	361
Other British Oceania	..	..	6	5,828	768
French Oceania	..	..	373	374,599	73,942
German Oceania	..	..	..	..	57
Philippine Islands	87	131,383	17	21,136	1,257
Belgian Congo	2	1,800	365	372,459	94,699
British West Africa	..	..	3	2,402	1,455
British South Africa	1	5,010	2	2,500	2,488
French East Africa	6	..	15	14,738	19,680
French Africa	..	..	3	3,504	481
Morocco	2	5,400	5	6,172	295
Portuguese Africa	..	..	..	..	..
Egypt	..	..	..	..	..
Total	1,755	\$3,908,484	7,879	\$8,325,563	\$4,561,287
Shipments to	..	..	..	..	..
Alaska	10	\$6,856	10	\$7,536	\$7,146
Hawaii	13	35,357	104	102,042	30,976
Porto Rico	15	36,621	42	62,637	22,197

This table supplements the one which appeared in the Aug. 14 issue of AUTOMOTIVE INDUSTRIES, and gives figures of all the individual countries, including those generally grouped under the collective heading of "Other Countries."

Los Angeles Speedway  
May Open February 22

NEW YORK, Aug. 15—The date of Feb. 22, Washington's Birthday, has been asked for by the promoters of the new Los Angeles speedway for the opening event. Contest officers of the American Automobile Association here, to whom the request was made, look with favor upon granting the date, but no official action can be taken until the fall meeting of the contest board, set tentatively for the month of November.

Details of the project available here indicate that the promoters, headed by J. M. Danziger, have obtained a tract of land between the Wiltshire and Pico Boulevards, almost midway between Los Angeles and Venice. A boarded speedway of 1 1/4 miles will be erected thereon with stands one-fourth of a mile in length, twenty rows deep and seating about 40,000 persons. It is understood that a total of \$400,000 is available for the project and that construction will start at once. The center of the track enclosure, according to letters from Danziger, will be converted into an aviation and polo field.

Danziger, the president, is also president of the Mexican Petroleum Oil Co., and lives at Los Angeles. Associated with him are several motor and motion picture men of that city.

No information has been received concerning the race or races projected for Washington's Birthday, but it was stated that the promoters hoped to hold big meets yearly on that date and Thanksgiving. Official reports concerning it are expected shortly from P. J. Walker, California director of the A. A. A., and J. B. Smith, contest representative at Los Angeles.

## UNIONTOWN LABOR DAY ENTRIES

NEW YORK, Aug. 15—Entries of six cars, both Frontenac and Duesenberg, have been received by the contest board of the American Automobile Association for the 225-mile race at the Uniontown, Pa., speedway Sept. 1. The Frontenac drivers are named as Gaston Chevrolet, Louis Chevrolet, Ralph Mulford and Joseph Boyer. The Duesenberg drivers are Thomas Milton and James Murphy.

The speedway officials have been given permission by the A. A. A. to start eighteen cars on the track, instead of fifteen as previously was the case. Charles W. Johnson, president of the speedway association, has announced that the qualification trials will be held on Aug. 30 and that a speed of 90 m.p.h. will have to be shown to permit starting.

## TIMKEN PLANT BUILDINGS

COLUMBUS, O., Aug. 18—The new plant here for the Timken Roller Bearing Co. will include a main building, 482 x 282 ft.; a carbonizing building, 160 x 61 ft.; a boiler house, 61 x 66 ft., and a chip storage building, 62 x 36 ft. The plant will be at Fifth and Cleveland Avenues.

## Diamond Vice-President Now McGraw Sales Manager

EAST PALESTINE, O., Aug. 16—H. M. Bacon, vice-president in charge of sales of the Diamond Rubber Co., has resigned to become general sales manager of the McGraw Tire & Rubber Co., with headquarters in Cleveland.

Harry C. Brownless has been appointed district manager for the McGraw Tire & Rubber Co., with headquarters at the new Detroit branch, 614 Woodward Avenue. He takes up his new duties after spending nine years with the Good-year organization.

G. F. Barnewall, formerly with the Chalmers Motor Co. of Canada, and during the war engaged on production of Liberty engines at the Aluminum Castings Co. plant in Detroit, has become manager of the Barney Sales Co., Detroit.

George A. Ault, who, during the first two years of the war, was connected with the Curtiss Aeroplane & Motor Corp., and during the latter stages of the war with the Canadian Aeroplane Co., Toronto, has been appointed material supervisor in the production division of the Grant Motor Car Corp., Cleveland.

R. B. Bowman, for a number of years western representative of the White Co., and more recently connected with the Denby Motor Truck Co., has been appointed central sales manager of the Standard Motor Truck Co., Detroit.

H. G. Pederson, formerly with the Wright-Martin Aircraft Corp., has joined the General Motors of Canada, Ltd., Walkerville, Ont. He will be in the production department.

Earl W. McGookin, vice-president of the M. V. Kelley Co., advertising agents, New York and Toledo, who resigned some time ago, will return to Detroit to resume his work as manufacturers' representative.

John Cleary, formerly with the Cadillac Philadelphia branch, is now advertising manager of the Cadillac Motor Car Co., Detroit. He succeeds Leo N. Burnett, who resigned to handle the advertising for the new company being formed by D. McCall White. Cleary handled the Cadillac advertising while Mr. Burnett was in the army.

L. W. Cash, for the past two years purchasing agent of the Wisconsin Parts Co., formerly the E. B. Hayes Machinery Corp., Oshkosh, Wis., has resigned his position, to take effect Sept. 1.

Arthur H. Blanchard has been appointed professor of highway engineering at the University of Michigan, to occupy the chair recently established. He will retain his consulting office in New York City until Sept. 15.

Leroy Rhodes has been appointed engineer in charge of farm machinery and farm buildings in the University of Nebraska department of agricultural engineering. He returned recently from ten months' service as a lieutenant in the aviation section in France.

## Men of the Industry Changes in Personnel and Position

### NEW BUS MANAGER

NEW YORK, Aug. 15—George H. Green, who since 1911 has been connected with the Fifth Avenue Coach Co. in the capacity of chief engineer, has been promoted to general manager of the concern which is now operating approximately 300 motor buses over the streets of this city.

Emlen S. Hare, vice-president of the Packard Motor Car Co., Detroit, has resigned. His career with the Packard company started as truck salesman in New York. He then became sales manager and later president. He resigned as president to become vice-president of the parent organization in Detroit. He has announced no future plans.

Robert P. Lay has been appointed special engineer in the engineering department of the H. H. Franklin Mfg. Co., Syracuse, N. Y. He was formerly assistant chief engineer of the Curtiss Engineering Corp., Garden City, N. Y.

Clarence M. Baldwin, who served on the Motor Transport Advisory Committee of the National War Work Council of the Y. M. C. A. during the war, left the committee when its work decreased and rejoined the Packard Motor Car Co. in Brooklyn.

F. L. Jepson, for two years district sales manager for the Willard Storage Battery Co., with headquarters in San Francisco, has resigned to go with the Southwell-Hunter Auto Co., Stockton, Cal., distributor of Chandler and Cleveland cars.

D. V. Halcomb, formerly field sales manager of the John Lauson Mfg. Co., has been made general sales manager of General Tractors, Inc.

E. C. Guthard will take charge of the Edgar C. Guthard Co., Chicago, manufacturer of Billmont wrenches. He disposed of his interest in the Northwestern Auto Supply Co., Billings, Mont., which he organized in 1914 to his father.

E. M. Newald, who recently returned from overseas, will be manager of the wholesale finance department of the Continental Guaranty Corp., New York City.

David Penn Moreton, associate professor of electrical engineering at the Armour Institute of Technology, has been made dean of the new Ambu Engineering Institute.

George N. Peek will become president and general manager of the Moline Plow Co., Moline, Ill., on Jan. 1, succeeding President Allen.

### GLIDDEN LEAVES ARMY

WASHINGTON, Aug. 14—Captain Charles J. Glidden, Publicity Officer of the Army Air Service, who donated the Shuppen-Glidden trophy for automobilism, was honorably discharged to-day and will return to his business interests.

### TRUCK SHOW COMMITTEE

NEW YORK, Aug. 19—The following men have been appointed by Charles Clifton, president of the National Automobile Chamber of Commerce, to be on the truck show committee to handle all commercial vehicle exhibits: M. L. Pulcher, chairman, Federal Motor Truck Co.; David S. Ludlum, Autocar Co.; A. J. Whipple, Diamond-T Motor Car Co.

### EAU CLAIRE AERO CORP.

EAU CLAIRE, WIS., Aug. 15—The Eau Claire Aero Corp. has been incorporated with a capital stock of \$25,000 by local business men. A hangar is being constructed on a new flying field established at the old fair grounds south of Eau Claire. Ensign Virgil R. Grace, late of the U. S. Navy, is vice-president and general manager, Guy R. Wood is president, and A. J. Walsh secretary-treasurer.

### NEW NAME FOR PECK & YOUNG

FORESTVILLE, CONN., Aug. 16—The Peck & Young Mfg. Co. has changed its name to Humason Mfg. Co., and its officers are: President, I. D. Russell; vice-presidents, J. M. Careny and S. M. Stone; secretary and treasurer, L. C. Humason. W. L. Humason, formerly president, is now chairman of the board.

The company is now manufacturing automotive parts and is doubling its present capacity.

### FIRM NAME CHANGED

DETROIT, Aug. 15—The Grinding Process Tool Co. is the new name of the corporation known heretofore as the Detroit Reamer Salvage Co. The firm began manufacturing six years ago, re-manufacturing worn-out reamers. The business has since expanded to take in all kinds of precision metal cutting tools.

### NEW NAME FOR MULTI-X

NEW YORK, Aug. 16—The name of the Multi-X Motors Co. has been changed to the Multi-X Aircraft Motor Co. and the capital of \$1,000,000 has been increased to \$3,000,000.

L. T. Knocks has resigned as experimental engineer of the Waukesha Motor Co., Waukesha, Wis., to become chief engineer with the Falls Motors Corp., Sheboygan Falls, Wis.

Ralph E. Keller has joined Buck & Hammesfahr, advertising agents, New York, Chicago and St. Louis. Mr. Keller has been associated with the advertising of Willys-Overland, Peerless and Cole cars, Stewart Warner speedometers, Republic and Garford trucks, Federal tires, Standard parts, etc.



**SMALL ARMS MAY GET JESSUP**

LONDON, July 21 (*Special Correspondence*)—Reports are current in Birmingham that the Birmingham Small Arms Co., which owns a controlling interest in the Daimler Co. and other corporations, is acquiring the steel works and business of William Jessup & Sons, Ltd., of Sheffield, one of the most eminent steel firms in Europe.

**MAKE WALLIS IN ENGLAND**

RACINE, WIS., Aug. 16—T. P. N. Burness, general manager of Ruston & Hornsby, Ltd., has been here for several days arranging for the British manufacturing privileges for the Wallis tractor. The company has eight large works in England and employs 20,000 or more men. During the war it was a large producer of aircraft as well as its regular line of gas, steam and oil engines.

**WILLYS HEADS LIGHT BOARD**

NIAGARA FALLS, N. Y., Aug. 16—John M. Willys was elected chairman of the board of directors at the annual meeting of the stockholders of the U. S. Light & Heat Corp. this week. Other officers are: vice-chairman of the board of directors, E. H. Gold; president, J. Allan Smith; vice-president and general manager, C. L. Lane; vice-president, R. C. Caples; treasurer, E. J. O'Reilly; secretary, R. H. Van Nest; assistant secretary and treasurer, T. G. Swannie. The following, with the officers, form the board of directors: J. E. Kepperely, C. O. Miniger, J. O. Moore, J. A. Roberts and G. G. Shepard.

**ABBOT-DOWNING PURCHASED**

CONCORD, N. H., Aug. 15—The controlling interest in the Abbot-Downing Co. has been purchased by H. A. Sevigne of Boston, Mass., and Nashua, N. H., manufacturer of the Sevigne Wrapping Machines and president of the National Wrapping Paper Co., who has been elected president and managing director, and his brother, F. J. Sevigne, elected a director and assistant to the president. Marcel Thorialt of Nashua, manager, has been retained.

**HUDSON INJUNCTION AGAINST BUTTS & ORDWAY**

PHILADELPHIA, Aug. 18—The Hudson Motor Specialties Co. recently secured an injunction against Butts & Ordway Co., Boston, Mass., restraining that company from selling any other crankcase repair arm than that manufactured by the Hudson Specialties Co. as that of the Hudson Co.

**PNEUMATIC TOOL OFFICES**

CHICAGO, Aug. 15—The Chicago Pneumatic Tool Co. will move its general offices to New York, into the building it is erecting at 6-8 East Forty-fourth Street in 1920. Sales and service organization will be maintained in Chicago.

**Current News of  
Factories****Notes of New Plants—  
Old Ones Enlarged****DU PONT EXPLAINS PURCHASE**

NEW YORK, Aug. 15—Explanation of the purchase of 27.6 per cent of the common stock of the General Motors Corp. by E. I. du Pont de Nemours & Co. was made to stockholders of that company by Pierre S. du Pont, chairman of the board, in a letter addressed to the stockholders. Part of his letter follows:

"Your company owns the equivalent of 27.6 per cent of the common stock of the General Motors Corp., the purchase of the same having been made by du Pont American Industries, Inc., all of whose stock is owned by E. I. du Pont de Nemours & Co. The investment was financed by advances to du Pont American Industries, Inc., on open account and the balance due, as of Dec. 31, 1918, appears in the first item of the statement and constitutes a part of 'advances to subsidiary companies' specifically stated. Since Dec. 31, the acquisition has been definitely financed through the purchase by E. I. du Pont de Nemours & Co. of stock of du Pont American Industries, Inc., on settlement of the open account."

**NEMOURS CONTROLS PERFECTION**

NEW YORK CITY, Aug. 18—In a special announcement to the automotive trade, the Nemours Trading Corp. states that it has become affiliated in the production and distribution of the tires and tubes manufactured by the Perfection Tire & Rubber Co., Fort Madison, Ia. The Nemours organization, by its representation in the directorate of the Perfection company, will dominate the manufacturing policy, and will distribute Perfection products through its sales organization.

**CANADIAN PLANTS NEAR COMPLETION**

WALKERVILLE, ONT., Aug. 15—The construction work at the plant of the Motor Products, Ltd., the Canadian branch of the General Motors Corp., is proceeding at such a rate that production will be commenced on a large scale by the end of this year. A company official stated that 2000 men would be employed by Jan. 1. Export of motor cars by this company is included in the program. It is proposed to ship cars to Great Britain, to take advantage of the preference on Canadian made automobiles. Axles and transmission shafts will be made at the Motor Products plant.

**NATIONAL BODY PAYS CLAIMS**

NASHVILLE, TENN., Aug. 18—On Aug. 25, the final payment of claims of the bankrupt National Body Mfg. Co. will be made.

**New Stoughton Truck  
Enters Production**

MILWAUKEE, WIS., Aug. 15—The Stoughton Wagon Co., Stoughton, Wis., one of the oldest heavy duty and farm manufacturing concerns in the United States, is engaging in the production of motor trucks, to be marketed under the trade name of "Stoughton," in 1½, 2 and 2½-ton capacities. The first model, a 1½-ton job, was completed during the week and is being given rigorous tests. The present plant is being enlarged by several additions to provide new facilities for motor truck assembling and machine work and it is intended that eventually the farm wagon department will take up only a small part of the factory. F. J. Veal is president and general manager of the company.

**ACASON 1½-TON IN PRODUCTION**

DETROIT, Aug. 15—The Acason Motor Truck Co. is now in fair production on its new 1½-ton chassis. A feature of this truck is that it is equipped with pneumatic cord tires as part of its standard equipment. The chassis has a Waukesha engine, Timken worm-drive axle, Blood Bros. universal joints, and Detroit Steel Products springs.

**MONARCH NOW GENERAL TRACTOR**

WATERTOWN, WIS., Aug. 15—The Monarch Tractor Co. with factories at Paulsboro, N. J., and Brantford, Ont., has increased its capitalization under the name of General Tractors, Inc., and has opened offices in Chicago and New York. It will add a garden tractor for truck gardening and vineyard cultivation to its line of creeper type tractors.

**PANHARD NOW APEX**

GRAND HAVEN, MICH., Aug. 15—The Panhard Motors Co. has changed its name to the Hamilton Motors Co. and its product will be known as Apex trucks. The change was made at the request of Panhard-Levasser Co., Paris, France. The 2½-ton model, formerly \$2,350, has been raised to \$2,475.

**DORT OPENS NEW YORK BRANCH**

FLINT, MICH., Aug. 18—The Dort Motor Car Co. has opened a branch with sales and showroom at the corner of Fifty-eighth Street and Broadway, which is its only direct factory branch.

**BEEMAN DROPS GARDEN**

MINNEAPOLIS, Aug. 15—The Beeman Garden Tractor Co. has dropped Garden from its name, and will hereafter be known as the Beeman Tractor Co., and its product as the Beeman tractor.

**G. M. C. BUYS TOOL CO.**

HASTINGS, MICH., Aug. 15—The Hastings Consolidated Press & Tool Co. has been purchased by the General Motors Corp. The capacity of the plant will be quadrupled and 1200 men employed.

# Calendar

## SHOWS

- Sept. 13-20—Cincinnati, O. Ninth Annual Music Hall, Cincinnati Automobile Dealers' Assn., H. K. Shockley, Manager.
- Sept. 15-20—Springfield, Mass. Eastern States Exposition.
- Sept. 24-Oct. 4—New York, N.Y. New York Electrical Show, Grand Central Palace.
- October—Ft. Dodge, Ia. Fall Motor Show, District Fair Grounds.
- Oct. 6-11—Detroit, Mich. Closed Car Show, Arena Gardens, Detroit Auto Dealers' Assn., H. H. Shuart, Mgr.
- Oct. 11-13—Pittsburgh, Pa. Fall Show.
- Nov. 3-8—Chicago, Ill. Business Exhibit of Automotive equipment Assn., Medinah Temple.
- Nov. 16-23—New York Automobile Salon, Hotel Commodore.
- January—New York. International Automobile Mfrs. Congress.
- Jan. 3-10—New York, N. Y. Grand Central Palace, National Automobile Chamber of Commerce, S. A. Miles, Manager.
- Jan. 3-10—New York City. Eighth Coast Artillery Armory, commercial cars and accessories.
- Jan. 24-31—Chicago, Ill. Coliseum, Cars; Drexel Pavilion, Trucks; National Automobile Chamber of Commerce, S. A. Miles, Manager.
- Jan. 24-31—Chicago. International Amphitheater, commercial cars and accessories.
- February—Chicago. International Automobile Mfrs. Congress.
- February—Deadwood, S. D. Annual show, Deadwood Business Club, F. R. Baldwin, Manager.

## FOREIGN SHOWS

- Aug. 23-Oct. 6—Toronto, Can. Cars, Trucks and Tractors, Airplanes and Motor Boats in conjunction with Canadian National Exhibition.
- Sept. 6-16—Ottawa, Ont.—Central Canada Exhibition.
- Sept. 24-27—London, Eng. Commercial Vehicles Exhibition, Olympia Society of Motor Mfrs. & Traders, Ltd.
- Sept. 24-27—Lincoln, Eng. Tractor trial, Society of Motor Manufacturers and Traders, Ltd.
- Sept. 24-27—Lincoln, Eng. Exhibition of tractors and agricultural vehicles, in connection with the tractor trials.
- \*Oct. 9-19—Paris. Grand Palais, International Automobile Mfrs. Congress.
- Oct. 14-16—Ottawa, Ont., Can. Interprovincial Plowing Match and Tractor Demonstration.
- November—Christchurch, N. Z. First National Motor.

- Nov. 7-16—London. Olympia Motor Car Exhibition—Society of Motor Mfrs. and Trades.
- December—Brussels. International Automobile Mfrs. Congress.
- January—Glasgow, Scotland. Scottish Motor Exhibition.
- February—Manchester, Eng. North of England Motor Exhibition.
- Feb. 23-March 6—Birmingham, Eng. British Industries Fair.
- March—London, Eng. Motor Boat, Marine and Stationary Engine Exhibition.
- April or May—London, Eng. Commercial Vehicles Exhibition, Olympia.

## AUTOMOTIVE SHOWS AT FAIRS

- Aug. 20-29—Des Moines, Ia. Machinery Hall.
- Aug. 26-29—Madison, Wis. Cars, trucks and tractors, accessories, Dane County Fair, Madison Assn. of Commerce.
- Aug. 26-29—Columbus, O. Cars and tractors. E. V. Walborn, Manager.
- Aug. 29—Detroit. Second Motor Show, Michigan State Fair.
- Aug. 30-Sept. 6—Minnesota State Fair.
- Aug. 31-Sept. 5—Lincoln, Neb. Cars, trucks and tractors. E. R. Danielson, Supt. of Concessions.
- Sept. 1-5—Hartford, Conn. Connecticut Fair Assn.
- Sept. 1-5—Wheeling, W. Va. Cars, trucks and tractors.
- Sept. 1-6—Indianapolis, Ind. State Fair. Cars and Accessories, Indianapolis Automobile Trade Assn., John B. Orman, Manager.
- Sept. 1-6—Rochester, N. Y. Automobile Club of Rochester. E. F. Edwards, Manager.
- Sept. 1-6—Spokane, Wash. Cars, trucks and tractors.
- Sept. 8-13—Helena, Mont. Cars, trucks and tractors, Montana State Fair.
- Sept. 8-13—Milwaukee, Wis. Milwaukee Automobile Dealers, Inc., Bart J. Ruddle, Manager.
- Sept. 8-13—Syracuse, N. Y. Cars, trucks and tractors.
- Sept. 8-13—Topeka, Kan. Cars, trucks and tractors, Motor Hall and Machinery Field.
- Sept. 9-13—Douglas, Wyo. Cars, trucks and tractors.
- Sept. 12-20—Peoria, Ill. Cars, trucks and tractors.
- Sept. 13-20—Hutchinson, Kan. Cars, trucks and tractors.
- Sept. 14-20—Sioux City, Ia. Cars, trucks and tractors.
- Sept. 15-20—Springfield, Mass. Cars, trucks and tractors. O. A. Nash, Asst. Gen. Manager.
- Sept. 15-20—Yakima, Wash. Cars, trucks and tractors.
- Sept. 16-19—Billings, Mont. Cars, trucks and tractors.
- Sept. 20-27—Oklahoma City, Okla. Cars, trucks and tractors. J. S. Malone, General Manager.
- Sept. 20-27—Memphis, Tenn. Cars, trucks and tractors.

- Sept. 22-27—Allentown, Pa. Lehigh County Agricultural Assn.
- Sept. 22-27—Pueblo, Colo. Cars, trucks and tractors. J. L. Beaman, Manager.
- Sept. 22-27—Salem, Ore. Cars, trucks and tractors. Dealers' Motor Car Assn., M. O. Wilkins, Manager.
- Sept. 24-Oct. 4—Kansas City, Kan. Cars, trucks and tractors.
- Sept. 29-Oct. 4—Meridian, Miss. Cars and tractors. A. H. George, General Manager.
- Sept. 29-Oct. 4—Chattanooga, Tenn. Chattanooga Auto Dealers' Assn.
- Sept. 29-Oct. 4—Muskogee, Okla. Cars, trucks and tractors.
- Sept. 30-Oct. 3—Brockton, Mass. Cars.
- Sept. 30-Oct. 4—Lancaster, Pa. Lancaster Fair Assn.
- October—Columbia, S. C. Columbia Automobile Dealers' Assn.
- Oct. 6-19—Dallas, Tex. Cars, Trucks and Tractors, Texas State Fair.
- Oct. 20-25—Raleigh, N. C. Cars, trucks and tractors.
- Oct. 22-27—Shreveport, La. Cars, trucks and tractors.

## TRACTOR SHOWS

- Aug. 19-21—Aberdeen, S. D. Regional Tractor Demonstration, National Implement and Vehicle Assn. George Haller, Manager.
- Aug. 19-22—Toledo, O. Lucas County Fair. H. B. Marks, Manager.
- Aug. 21-22—Butler, Pa. State Demonstration under auspices of State College, manufacturers and distributors.
- Aug. 26-28—Rockford, Ill. County Fair.
- Aug. 26-29—Harrisburg. Cars, tractors, trucks, automotive equipment. J. Clyde Myton, Manager, in connection with Grangers' Picnic at Williams Groves, Harrisburg Motor Dealers' Assn.
- Aug. 26-30—Wausaw, Pa. Marathon County Fair.
- September—Los Angeles, Cal. Regional Tractor Demonstration under the auspices of the National Implement & Vehicle Assn.
- Sept. 1-6—Greenville, S. C. Agricultural Implements and Tractors. F. M. Burnett, General Manager.
- Sept. 8-13—Huron, S. D. Cars, tractors, trucks, automotive equipment. C. N. McIlvane, Manager.
- Sept. 9-12—Streator, Ill. Northern Illinois Tractor & Truck Assn.
- Sept. 15-20—Allentown, Pa. Lehigh County Agricultural Assn.
- Sept. 22-23—Waterloo, Ia. Automobile show, in connection with Waterloo Dairy Cattle Congress; Black Hawk County Motor Trades Bureau, G. V. Orr, Secretary.
- Nov. 22-23—Jacksonville, Fla. Florida State Fair and Exposition. B. K. Hanaford, Manager.

- February—Kansas City, Mo. Fifth Annual Kansas City Tractor Club, Guy H. Hall, Manager.
- Feb. 9-14—Wichita, Kan. Tractor and Farm Machinery, Forum, Wichita Thresher-Tractor Club.

## CONTESTS

- Aug. 23—Elgin, Ill. 308 Mile road race.
- Sept. 1—Uniontown, Pa. Speedway race.
- Sept. 20—Sheepshead Bay, L. I. Speedway race.
- Sept. 27—Allentown, Pa. Dirt track event.
- Oct. 4—Trenton, N. J. Dirt track event.
- Oct. 11—Cincinnati, O. Speedway race.
- Oct. 11—Danbury, Conn. Dirt track event.
- \*Nov. 27—Los Angeles, Cal. Ascot Speedway race.
- July, 1920—Paris, France. Grand Prix Race, Sporting Commission, Automobile Club of France.

\*Tentative date.

## CONVENTIONS

- Sept. 3—New York City. Annual meeting of the Automotive Service Assn. of New York, N. A. C. C. rooms, 7 E. 42d Street.
- Sept. 8-9—Chicago. Industrial Conference Illinois Mfrs. Assn., Congress Hotel.
- Sept. 11-12—Buffalo, N. Y. Annual Credit Manufacturers' Convention, Motor and Accessory Mfrs. Assn., Hotel Lafayette.
- Sept. 22-24—Philadelphia. Annual Convention, National Association of Purchasing Agents, Bellevue-Stratford.
- Oct. 1—Denver, Colo. Directors' Meeting, National Automobile Dealers' Assn.
- Oct. 1-4—Cleveland. Eighth annual safety congress of National Safety Council.
- Oct. 9-10—Jackson, Miss. Second Annual Convention, Louisiana - Mississippi Assn.
- Oct. 14-17—Atlantic City, N. J. Twenty-fifth Annual Convention, Marlborough-Blenheim, National Hardware Association of the United States.
- Oct. 29—Washington, D. C. Annual Labor Conference provided by Peace Treaty.
- November—London, Eng. Road Transport Congress and Exhibition.
- Nov. 3-8—Chicago, Ill. Convention, Automotive Equipment Assn., Medinah Temple.
- January, 1920—Washington. Pan-American conference.
- Feb. 9-13—Louisville, Ky. Seventeenth Annual Convention American Road Builders' Assn.; Tenth American Good Roads Congress and Eleventh National Good Roads Show.
- May 15-20, 1920—San Francisco. Seventh National Foreign Trade Convention.

## FOREIGN TRADE OPPORTUNITIES

WASHINGTON, Aug. 15—The Bureau of Foreign and Domestic Commerce, Department of Commerce, has received requests for automobiles or parts agencies of business from individuals and companies in foreign countries. For further information address the Bureau of Foreign and Domestic Com-

merce and specify the Foreign Opportunity number.

**Belgium**—Automobiles of the best makes. Correspondence should be in French, and catalogs in French are requested. 30342.

**France**—Automobile accessories. Quotations should be given c.i.f. Bordeaux or Havre, with duty paid. Payment by

draft on Paris or New York. Correspondence should be in French. 30343.

**Argentina**—To purchase and also represent on a commission basis manufacturers of automobile accessories. Correspondence should be in the Spanish language. 30355.

**Norway**—Catalogs and price lists of automobiles and accessories. 30366.